

# The Chemical Age

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**NOTICES**.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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## The Coal Situation.

EVERYONE is abusing Mr. Baldwin for either his wickedness or his weakness in granting a subsidy to the coal industry as a means of securing a nine-months armistice. Let it be frankly admitted that a subsidy is no remedy, that it represents a vicious principle, that it sets a precedent which other industries in difficulty will be sure to use to support a claim for similar assistance. Nevertheless, whether we listen to the screaming from Carmelite House or to the quieter reasoning of business men and serious politicians, no one furnishes an immediate practical alternative for avoiding a disastrous conflict. For a time the tension in the coal industry may be relaxed—at the cost of the already too heavily burdened taxpayer. In a few months' time, however, the problem which has been bribed to go away for a short holiday will return in its present ominous form. When that moment comes, will the Government or the nation, the owners or the men, be prepared with a remedy that nobody can produce to-day? Something may, perhaps, turn up in the meantime. The effects, for example, of a too sudden return to the gold standard may be corrected. But the prospect at the moment seems none too good.

If Mr. Baldwin's subsidy is no solution, neither is force a remedy nor Fabian theories of nationalisation any effective reply to lower-priced competitive supplies. Some of the best things said have come, not at all to our surprise, from Sir Alfred Mond. Longer hours and lower wages he dismisses as tending to want of efficiency and to the increase rather than the diminution of costs. He looks for salvation instead to improved methods, labour-saving devices, better technique, the fuller use of invention and research, stricter attention to organisation and administration, the revision of antiquated methods of salesmanship. These are not the airy dicta of a doctrinaire ; they are the conclusions of one born into a scientific tradition, who has seen more difficult problems even than that of the coal industry turned into great national successes by the union of science, industry, and management of the highest order. It is in that direction, it seems to us, that the nation must look for the real cure for the coal situation. The only drawback is that all this radical reform of conditions requires time.

By implication, all this necessarily means that inefficient management and obsolete methods may be held accountable to a considerable degree for the present position. Only last week we quoted the opinion of some of the American chemical engineers on certain points on which our ways seemed to them hopelessly out of date. The strong objection of the better organised collieries to be pooled with the smaller and less efficient points in the same direction. We must not anticipate the result of the inquiry which is to be instituted, but there is a widely spread impression that our coal-getting methods have not kept pace with modern industrial and engineering progress. Coal deposits we still have in abundance. So long as conditions favoured us against foreign competitors, and old-fashioned methods still left a sufficient margin of profit, old-fashioned methods were considered good enough. Now that conditions are against us, they are not good enough, and when a demand is made for rapid modernisation the reply is that the cost is prohibitive. Surely that in itself is judgment against the management of having taken too much out and neglected to put in what was required to guarantee efficiency. Another point that requires explanation is the wide disparity between the cost of coal at the pit head and its cost to the consumer. Why, for example, can a large industrial concern buy good quality coal at the pit head at about 25s. a ton, and bring it to the works at a total price of about 30s. a ton, or even less, while the consumer who gets his supplies through the ordinary distributive agencies is charged at so much higher a figure? These are questions on which a searching inquiry should throw light.

Meanwhile, as we have frequently of late pointed out, the scientific study of the fuel problem abroad seems in advance of anything attained here. The chemical research work of Bergius, Fischer, and the Badische Co. in Germany and more recently that of Patart in France has gone far towards effecting, on a practical basis, the complete conversion of coal into oil. In addition, there is Germany's success in the production of synthetic methanol, in which American oil technologists are intensely interested on account of its menace to the United States wood distillation product. We in this country utilise thousands of tons of methanol annually, most of it imported from the United States and Canada at about £50 a ton, while it is claimed that the German synthetic product can be put on the London market at £15 a ton. We may not see at present how the enormously more fruitful methods, developed in Germany and France by chemical fuel experts, for the treatment of coal or its by-products, are to bring better wages or higher profits for those who produce the raw material. They do show the fundamental part that science, especially chemical science, must play in any effective effort to reform the control, working, and treatment of our coal resources. And it is essentially the dry scientific view that vast stores of natural fuel, slowly accumulated without human aid in the laboratory of Nature, should be regarded primarily from the standpoint of the communal good.

### The Efficiency of Solid Adsorbents

WHEN, earlier in the year, the report of the research Committee of the National Benzole Association was published, we expressed the opinion that the problem surrounding the use of solid adsorbents (such as active carbon and silica gel) is one of such unusual complexity that its importance to certain large industrial interests in this country demanded investigation by a qualified and representative technical body. Within the last year or two so much has been said about the respective merits of different adsorbents, that, between the statements of the advocates of specific materials, it has been almost impossible to form a true opinion of the situation. It will be recalled that the report of the National Benzole Association, though even yet the work of the research committee is far from completed, carried us a good deal further in our knowledge of the relative efficiency of various types of carbon and silica gel, and further light of an interesting nature was shed on the subject by Mr. W. H. Hoffert at the recent Leeds meeting.

In applying such adsorbents to benzol recovery, besides the efficiency with which the benzol can be removed from the gas by the adsorbent, the maximum quantity of benzol which the adsorbent will take up from the gas under the existing conditions, and the ease with which this adsorbed benzol can be removed from the adsorbent, are important considerations on which the cost of working the process will largely depend. Of equal importance from the economic point of view is the length of time the adsorbent is able to withstand the conditions of use without losing its adsorptive properties. Apart from the question

of the stability of the adsorbents, there are certain differences in their properties. Thus, active carbon is claimed to have a much greater adsorptive capacity than silica gel and iron oxide gel at low vapour concentrations, and also to adsorb selectively organic vapours in preference to water vapour. Considerable differences of opinion have been expressed as to the importance of these properties from the point of view of benzol recovery. Mr. Hoffert gave added interest to his paper by including figures (which, to the best of our recollection are the first of their kind published) for the adsorptive capacity of iron oxide gel—a substance whose utility has been rather vaguely known of, but which does not seem to have attracted very serious attention. It would now be apparent, however, that in conjunction with the removal of benzol from gaseous mixtures, this material scarcely bears comparison with the better known substances, for it has a very much smaller adsorptive capacity than have active carbon and silica gel. Besides being selective towards water vapour, it suffers from the further disadvantage that it cannot be heated above 250° C. without destroying its adsorptive properties.

An ultimate selection remains, accordingly, to be made between carbon and silica gel, and as both of these materials possess almost identical adsorptive capacities from the volumetric standpoint, it must remain for further work on a commercial scale to decide whether there is anything to choose between them from the point of view of works operations. There has, perhaps, been some tendency in this country to bring out a little unduly the superior merits of active carbon, and we thoroughly endorse the suggestion of Mr. Reavell that when figures relative to silica gel are given, the exact grade of the gel used should be plainly stated. The impression seems to prevail that there is only one grade of gel, whereas on the contrary, there are a number of different varieties, each of which will probably give different results. As to the process as a whole, success or failure would appear to depend upon the cost and working life of the material used; and the ultimate criterion must be based not only on the cost of recovering crude benzol by utilising one material or the other, but on a comparison of the use of solid adsorbents with those systems of oil-washing at present in vogue.

### Synthetic Benzene

THE rapid development in the production of synthetic solvents has resulted in great strictness in the specifications of these substances. It is not only necessary to conform to definite B.P.'s, specific gravities, flash points, absence of impurities, etc., but the manifold applications of these solvents have shown that a solvent consisting of one chemical component is superior to any other, particularly where chemical reactions are concerned. The simplest method of producing benzene synthetically would be by polymerisation of acetylene, which, in its turn can be readily obtained from carbon, lime and water. In some text books it is stated that benzene can be produced by the polymerisation of acetylene. This statement, however, is not accurate. During the condensation of acetylene, several other compounds are formed as well. It is obvious that in a well-regulated process, the nearest homologues

would contain four or eight carbon atoms, and, in consequence, separation by fractional distillation should be simpler than in the case of coal tar.

From recent independent researches by Zelinsky, Kavoche, and Tricot and others, it is apparent that by subjecting acetylene to high temperatures, on an average 75 per cent. of liquid hydrocarbons are obtained which contain 35 per cent. of benzene with varying quantities of other hydrocarbons. The elucidation of this process is complicated on account of the pronounced catalytic action exerted by various elements. The contradictory observations of various writers are probably accounted for by these and other unknown factors. Synthetic benzene could probably be obtained free from paraffins, olefines, thiophens, diphenylsulphone and other sulphur compounds which are detrimental in numerous applications of benzene and are regularly present in coal tar benzene. The synthetic production of benzene is a continuation of the era inaugurated by the production of synthetic phenol, and is another step in the elimination of uncontrollable processes in chemical manufactures.

### Chemical Research in Russia

SOME encouragement is to be drawn from the chemical publications which from time to time reach us from Russia, showing that under great difficulties an earnest effort is being made to keep chemical research alive. The latest of this class to be received is Volume LV. of the Journal of the Russian Physico-Chemical Society of the University of Leningrad, sections 5 to 9, forming the chemical section. It is made up of papers dated from 1919 to 1923, and the subjects range generally over the whole field of chemistry. It gives us no direct information as to the present state of chemical studies either in Leningrad itself or in other universities such as Moscow, Charkov, Kazan, and Kiev, but it shows at least that some of the chemical schools are seriously at work again, and supports a hope that gradually science in Russia may recover its recognised place. It will be welcome evidence for the scientific organisations in this country, which a few years since raised funds for supplying distressed Russian men of science with food, clothing, books, and apparatus, that their work has not been entirely lost. From another side, it suggests that the new rulers of Russia may have begun to realise that while revolutions may clear some obstacles out of their way, their real problems remain to be settled largely by science. Naturally Russia should be one of the richest empires in the world, with almost endless opportunities for expansion, but its riches will only be made available for the use of its people by the work of the chemist and the engineer, and the sooner the better its political visionaries realise this plain truth. In one of his presidential addresses to the Chemical Society, Professor W. P. Wynne expressed some doubt as to whether, owing to the impoverishment of the country, the endeavour to secure publication of Russian work in Russian, which met with much success before the war, could be maintained, or there would be a reversion to the earlier practice of publishing in German, or less frequently in French. This volume, nearly approaching 350 pages, is at any rate all in Russian, with the exception of one contents page printed in French.

### Higher Sulphate Prices

AFTER a series of slight reductions over a considerable period the price of sulphate of ammonia is now beginning to move upward again. The new official price list issued by the Sulphate of Ammonia Federation indicates an increase on the existing figure of £12 5s. per ton to £12 7s. for September, £12 9s. for October, and £12 11s. for November. These prices, as usual, apply solely to orders for home agricultural consumption, and the usual stringent restriction remains in force respecting purchases for export. The grade covered by these prices is neutral quality in fine friable condition, free from lumps, with a nitrogen content of 21.1 per cent. The Federation are arranging as far as possible to reserve sufficient quantities for the home market, but a warning is given that, owing to the depression in the iron and steel and other industries, production has been reduced and may be still further curtailed if a stoppage occurs in the coal trade. Farmer customers are therefore advised to order supplies early. The production of "ordinary" quality apparently continues to decline. As no sulphate of this quality is likely to be available for the ensuing three months no price is quoted for it.

### The A.C.S. Seventieth Meeting

THIS week the American Chemical Society is holding its seventieth meeting at Los Angeles, California. The principal British visitor appears to be Dr. Alexander Findlay, of Aberdeen, who is delivering a special address on "The Twilight Zone of Matter." In addition to an extensive round of excursions and social meetings, there is a very full programme of papers and discussions. The "symposium" method has been adopted in several cases, and among the subjects to be discussed in this way are "Chemistry and Plant Life," "Insecticides and Fungicides," "Pectin," "Objectives in Teaching Chemistry," "Chemical Industries of the West," and "Strong Electrolytes." The various sections into which the organisation is divided include agricultural and food chemistry, biological chemistry, sugar chemistry, chemical education, industrial and engineering chemistry, the chemistry of medicinal products, petroleum and gas and fuel chemistry, organic chemistry, and physical and inorganic chemistry. There is altogether a spaciousness about these American chemical programmes that makes the best we are capable of here look modest in comparison, and the publicity service is so good that already notices of the proceedings are appearing in the London daily press.

### The Calendar

Aug. 26 to Sept. 2	British Association for the Advance- ment of Science.	Southampton.
Oct. 4	Société de Chimie Industrielle : Fifth Annual Congress	Paris
Oct. 23	Engineers' Club: Annual Dinner.	Savoy Hotel, London

## Industrial Utilisation of Leather Scrap

*In a recent issue of the American Chemical Society's Journal an interesting account was given of a process for carbonising leather scrap whereby a series of products are obtained which should find profitable use in industry. The investigation of the process was conducted by Mr. Joseph Michelman, and below we give an abstract of the conclusions at which he arrived concerning its possibilities.*

THE utilisation of the large amount of leather scrap that accumulates in the leather-working industries has heretofore been confined principally to agricultural purposes. However, with the advent of improved methods for the fixation of atmospheric nitrogen and for the synthetic production of ammonia, and with the increasing availability of ammonium sulphate from gasworks, it is highly probable that the scrap will henceforth find decreasing use in the production of fertilisers.

A process of general applicability to the enormous variety of leathers and to the numerous shapes and sizes of which the scrap is composed is afforded by that of destructive distillation. The thermal decomposition of leather would, of course, yield a charred residue and ammonia, but in this investigation an attempt was made to study more completely these as well as the other distillation products. Leathers for this purpose can be classified advantageously according to the tannage to which they have been subjected—*i.e.*, vegetable-tanned, mineral-tanned, and oil-tanned leathers. The shoe-making and the leather-working industries constantly produce considerable quantities of clean, classifiable scraps and wastes, easily segregated in accordance with the tannage. Another convenient classification is into sole leather and "upper" leather, for nearly all of the former is vegetable-tanned and most of the latter is chrome-tanned.

### Destructive Distillation

The destructive distillation of leather scrap is carried out in a manner analogous to that used in the carbonisation of wood or other organic matter. The scrap, compactly bound into bales or billets, is heated in retorts, preferably under diminished pressure. An evolution of vapours begins at about 100° C., and as the temperature is gradually raised a carrier gas, such as steam or flue gas—or even some of the "leather gas" previously evolved—may be introduced into the retorts to promote the removal of the volatilised decomposition products. These evolved vapours, upon condensation, yield a distillate composed of an ammoniacal liquor, an oil, and, in the case of vegetable-tanned leathers, a tar also. A charred residue of animal charcoal, which from mineral-tanned leathers also contains metallic oxides, remains in the retorts; the noncondensable gases—"leather gas"—are combustible, and are, therefore, appropriately scrubbed and then burned under the retorts for fuel.

A study of the charred residue remaining in the retorts reveals that it possesses many of the desirable properties of a decolorising carbon. The char from vegetable-tanned leathers is a form of animal charcoal obviously containing some vegetable charcoal arising from the tannin substances. It is composed of nearly pure carbon, liberated at a comparatively low temperature, 350° to 450° C., which is much lower than the critical temperature range below which active or activatable carbon should be liberated from its compounds. The anatomical structure of the hide is conducive to the formation of a char of great porosity upon carbonisation. Leather and bones have in common the gelatinous content which is the carbon-forming matter upon destructive distillation. Accordingly, "leather black" will have some of the same primary or active carbon that is found in bone black. "Leather black" is active—it possesses decolorising properties which were confirmed by semi-quantitative tests with methylene blue—although it is not so active as some of the better grade activated decolorising carbons.

The char from chrome-tanned leathers contains 10 to 20 per cent. of chromic oxide ( $\text{Cr}_2\text{O}_3$ ). The latter can be recovered very easily by burning the char from chrome-tanned scrap in a current of air. The char then burns readily and without odour, and the chromic oxide remains as a fine, green ash. The char from chrome-tanned leather thus simulates bone char, in that it has a mineral constituent intimately associated with the carbon content. It would be highly desirable to remove this valuable mineral matter and thereby leave a carbon of exceedingly porous nature. The various solvents, such as Rochelle salt, hydroxy organic acids, etc., recommended for the extraction of chromium from leather

scrap, have little if any effect in removing the chromium from the char, because the chromium is now in the condition of the oxide,  $\text{Cr}_2\text{O}_3$ , which is rather inert chemically. The chromium, which is precipitated in the leather in the process of tanning as the hydroxide,  $\text{Cr}(\text{OH})_3$ , is dehydrated into the oxide by the higher temperatures used in the process of destructive distillation. It is possible to use the char from chrome-tanned leather scrap as a decolorising carbon and after it has become spent to burn it for the recovery of the chromic oxide. The chromic oxide obtained by either method should find ready use as the pigment "chrome green," and for this purpose it is in an excellent state of subdivision.

The condensable distillation products comprise 40 to 50 per cent. of the weight of the original leather scrap. Many of the constituents of the distillate are common to all kinds of leather; for instance, the hide substance will yield the same decomposition products irrespective of the tannage. Although it is thus possible to charge the retorts with segregated portions of scrap classified according to the tannage and to treat the distillates from all leathers in common, it is preferable, for simplicity of subsequent operations, to carbonise the chrome- and vegetable-tanned leathers separately.

### Ammoniacal Liquor

The ammoniacal liquor, which is very readily separated from the tar and the oil by decantation, contains ammonium salts such as the carbonate, the sulphocyanide, the sulphite, and the thiosulphate, etc., and polyhydroxy phenols such as pyrogallol and pyrocatechol. These phenols are obviously the decomposition products from the vegetable tanning matter. It is not desirable to recover the ammonia by the usual methods of distillation and absorption of the evolved ammonia gas, because of the instability of the phenols in alkaline solution. It is much preferable to add sufficient calcium chloride to the ammoniacal liquor to precipitate the carbonate present. The supernatant liquid is decanted from the precipitate of calcium carbonate, and it may be heated and evaporated without any injurious effects to the phenols, whereupon much of the empyreumatic matter is expelled, and the ammonium chloride crystallises out. Provision may be made for collecting the initial vapours arising from the evaporating ammonium chloride liquor, for these contain some pyrrole, amines, etc.

The tarry and the oily portions of the distillate contain principally pyrrole, pyrrole derivatives, pyrococll, hydrocarbon oils, and some phenols. Mineral-tanned leathers yield a dark-coloured, viscous oil, lighter than the ammoniacal liquor. The crystals of pyrococll are plainly discernible suspended between the oily and the aqueous layers. Vegetable-tanned leathers yield a light coloured oil, lighter than the ammoniacal liquor, and in addition a tar heavier than the ammoniacal liquor. In this instance the tar contains the pyrococll and most of the pyrroles, while the upper oil is composed principally of hydrocarbon oils. The following treatment is applicable to both cases: To the tarry and oily portions, separately or combined, is added a diluent and solvent such as benzene, toluene, solvent naphtha, etc., which enables the crystals of pyrococll to be filtered off very easily. The filtrate may be washed with water to remove the remaining phenols, and it is then distilled into two fractions: A, up to 200° C., and B, 200° to 310° C. The solution of the pyrroles in toluene, which constitutes the lower boiling fraction, is treated with sufficient solid potassium hydroxide to combine with the pyrroles to form potassium pyrroles, which separate from the solvent, thus permitting the recovery of the latter for re-use. Sodium hydroxide is unsuitable for this purpose; sodium metal reacts with difficulty with the pyrroles; potassium metal would be satisfactory, but it is too expensive. Digestion of the potassium pyrroles with water liberates the pyrroles as an oil with the formation of aqueous potassium hydroxide solution. This alkaline solution may be used advantageously to decompose the pyrococll into the potassium salt of  $\alpha$ -pyrrole-carboxylic acid, or it may be used in making iodol (tetraiodopyrrole), or it may be used in the process of converting pyrrole derivatives into indole derivatives. The

oil obtained from the action of water on the potassium-pyrroles is fractionated for pyrrole and its homologues,  $\alpha$ - and  $\beta$ -methyl-pyrroles, dimethylpyrroles, etc.

#### Absence of Pyridine Bases

At the outset of this investigation the absence of considerable amounts of pyridine bases was observed. The addition of calcium chloride to the ammoniacal liquor yielded a liquor with an odour more characteristic of resinified pyrrole than of the pyridine bases. This observation was not fully explained until months later, when a study was made of the literature on bone oil. Weidel and Ciamician, in order to determine the sources of the various constituents of bone oil, destructively distilled gelatin, which they presumably used as representative of the gelatinous substances present in bones. These investigators found no detectable amounts of pyridine bases in the decomposition products resulting from the destructive distillation of gelatin, and they stated also that nitriles of the fatty acids were not formed from gelatin. They then postulated that the pyridine bases in bone oil were formed by the condensation of the ammonia, methylamine, etc., with the acrolein arising from the decomposition of the glycerol of the fats, which view seems to be accepted to-day.

Leather and gelatin are both produced from the same parent material—that is, clean, fat-free hide substances; and they should yield thermal decomposition products common to both. Weidel and Ciamician found in their investigation of the decomposition products from gelatin, ammonium salts, pyrrole and pyrrole derivatives, pyrocoll, amines, phenol ( $C_6H_5OH$ ), hydrocarbons, etc. The same substances were independently found among the distillation products from leather scrap. The obvious conclusion is that hide substance, to which a phenolic or a mineral-tanning agent has been added, should yield the same thermal decomposition products as gelatin gives, and it should yield neither pyridine bases nor fatty acid nitriles. There are, however, additional constituents in leather that apparently negative the foregoing conclusions when applied to finished leather, and these substances are the fats and oils which are used in fat-liquoring and currying.

The condition and the nature of leather scrap preclude an unqualified generalisation that pyridine bases are not formed in the destructive distillation of the scrap. If any pyridine bases are formed they would be present in minimal amounts, and they would arise from the fats and oils present, but only if such fats and oils were glycerides. This point has been especially studied, for the statement has appeared in the literature that pyridine bases are among the thermal decomposition products of gelatin and of leather. Scrap leather is a fruitful source for pyrroles and pyrocoll, and it offers marked advantages over bones for obtaining these substances. The yield of pyrroles per ton of scrap leather is greater than that from a similar quantity of bones, owing to the much larger content of gelatinous matter in the leather scrap. Moreover, the pyrroles obtained from scrap leather can be made practically free from pyridine bases and fatty acid nitriles which complicate the extraction of the pyrroles from bone oil. The conversion of the pyrroles into the corresponding indole derivatives offers an excellent use for these substances.

It is difficult to determine whether the saturated aliphatic hydrocarbons obtained as by-products from the distillation of leather scrap are the original oils used in currying and dressing the leather, or whether they are the decomposition products from the fatty acids present. The latter view is suggested by the consistent formation of these oils from all kinds of leather scrap, by the presence in leather of fatty acids, and by the boiling points of two of the oils, about  $272^\circ$  and  $306^\circ$  C.

Palmitic acid,  $C_{16}H_{31}COOH = CO_2 + C_{15}H_{32}$ , b. p.  $270^\circ$  C.  
Stearic acid,  $C_{17}H_{35}COOH = CO_2 + C_{17}H_{36}$ , b. p.  $303^\circ$  C.

The mineral or hydrocarbon oils that may be used to treat leathers might, of course, contain oils of these boiling points. Some hydrocarbon oils are also formed from the animal matter present in the leather, but these oils are lower boiling and are principally aromatic. The question of the formation of the hydrocarbon oils can be settled only by the carbonisation of leather of known origin and history; this is obviously not possible with scrap leather. A satisfactory solution of this question is important, for if the fatty acids decompose into hydrocarbon oils, then fatty acid nitriles are not formed; and if this is correct, then a previous extraction of the fats and oils from the scrap is not necessary. The hydrocarbons

are recoverable and are members of the upper boiling fractions of petroleum used as lubricants.

By this process there have been obtained from scrap leather the following industrially valuable substances: (1) animal charcoal, (2) chromic oxide—"chrome-green," (3) ammonium chloride, (4) precipitated calcium carbonate, (5) sulphoncyanide, (6) pyrocatechol, (7) pyrocoll, (8) pyrrole and homopyrroles, (9) higher pyrroles, (10) a fuel gas, (11) hydrocarbon oils, and (12) fats and oils (solvent extracted).

#### Earl Haig's British Legion Appeal

To the Editor of THE CHEMICAL AGE

SIR,—Eleven years after the commencement of the great war, there is still only too ample reason for making this national anniversary the occasion of a special appeal to the generosity of my fellow countrymen and women on behalf of ex-service men, their widows, and dependents. I am quite sure that the passage of time cannot lessen the deep sense of gratitude felt by all who lived through the  $4\frac{1}{2}$  years of war anxiety and strain towards the men who fought for us. Yet in the press of present interests and occupations it is easy to overlook the obligation which our gratitude involves. Therefore, I write to remind my fellow countrymen and women that the debt we owe individually and collectively to the men who saved our homes, our fortunes, and our independence is not yet paid in full. The 4th of August, a date which to our generation must always mean so much, gives us an annual opportunity to try at least to keep level with our debt.

During last year the 1,600 voluntary relief committees of the British Legion alleviated over 300,000 cases of distress. That this organization built up by the British Legion is efficient in its working is evidenced by the following extract from the report of a distinguished journalist who, armed with full powers, made a searching impartial investigation into every department of the Legion's work:—"The real service which the Legion renders is in the putting of men on their feet when they are nearly beaten, finding them employment, saving their self-respect, giving them advice and fighting their claims for them, caring for the tubercular and nervous wrecks, helping to educate the orphan children, looking after widows' pensions, keeping homes together and hearts from utterly sinking."

Once more I ask those whose memories can recall the emotions of that fateful August 4, 1914, to give all they can, and perhaps more than they can spare, to show that they are not unmindful nor ungrateful. Cheques made payable to "Earl Haig's British Legion Appeal," and crossed "Barclay's Bank, Ltd." should be sent to the Organising Secretary (Captain W. G. Willcox, M.B.E.), Appeal Department, British Legion, 26, Eccleston Square, London, S.W.1.—Yours, etc.

HAIG, F.M.

26, Eccleston Square, S.W.1. August 4, 1925.

#### The New Crozier Process

To the Editor of THE CHEMICAL AGE

SIR,—Behind the Burma (Schweppes) Pavilion at the British Empire Exhibition, Mineral Oils Extraction, Ltd., have erected a commercial working plant of ten tons daily capacity for demonstrating the low-temperature carbonisation of non-coking coals and oil-shales by the new "Crozier" process of treatment. This process effects radical economies in both capitalisation costs and operating costs, and places the question of low-temperature carbonisation of non-coking materials on an entirely new economic and financial basis. The retort may be built in single units to treat from 20 tons to 500 tons per day, and the oils, instead of being recovered in crude condition, are recovered as fractionated and semi-refined products in one direct and continuous process of operation.

The question of low-temperature carbonisation is one of enormous public importance at the present moment, and you will doubtless recognise what an important bearing the solution of this question must have in the resuscitation of the coal industry. We therefore venture to bring this matter to your notice as one which should be of great interest to your readers, and to make it generally known that our plant may be seen and the process explained at Wembley.—Yours, etc.

R. H. CROZIER,

General Manager, Mineral Oils Extraction, Ltd.  
London, August 4.

## Disposal of Sugar Beet Waste

### Economic Methods of Dealing with Chemical Products

In view of the present interest in the establishment of the sugar beet industry in Great Britain and the Government's encouragement to projected schemes, a paper read before the American Institute of Chemistry by Professor E. Bartow, head of the Department of Chemistry, Iowa University, should be of particular practical interest. Waste, Professor Bartow pointed out, from a beet sugar factory, like that from other organic chemical industries dealing with carbohydrates, contained large amounts of putrefactive organic matter both in suspension and solution. Factories located on large streams disposed of this waste easily by dilution. Factories not so located had difficulties because the concentrated organic waste removed the oxygen from the water and fish were killed. Much effort had been expended to prevent this trouble and also to make an economic use of the waste.

Waste from a sugar factory might be classified as follows: (1) beet washing water, (2) battery water. In a plant of approximately 1,000 tons daily capacity there will be about 4,000,000 gals. of beet washing water, 600,000 gals. of battery water, 150,000 gals. of lime waste, and 250,000 gals. of Steffen's waste.

The beet washing water had low oxygen-consuming power compared with that of the other wastes, and should have less deleterious action on the stream. The battery water, including the water from the pulp presses, contained fine particles of pulp in suspension and organic soluble matter, both of which were putrescible. The pieces of pulp could be removed by fine screens, and the water treated with lime and then with carbon dioxide, the precipitate removed and the water returned to the process.

### Some Experimental Results

At an experimental disposal plant at a factory of the Holland-St. Louis Sugar Co., tests were run on the crude waste from the diffusion batteries and the pulp presses. A screen, settling tanks, sludge beds, sprinkling filters, sand filters, and an arrangement for dosing with lime were used. Results showed that fine screens were necessary for any type of treatment plant. The effluent of the settling tanks could be treated on sprinkling filters at a rate of about 200,000 gals. per acre per 24 hours, and on sand filters at a rate of about 75,000 gals. per acre per 24 hours. Should the concentrated sewage be mixed with an equal volume of beet-carrying water, the data indicated that a settled effluent could be treated on sand filters at a rate of 100,000 gals. per acre per 24 hours. It would have been desirable to make further tests with a mixture of the diffusion battery and pulp-press waste and an equal volume of beet-carrying water. These rates of filtration resulted in quite costly installations, and every effort should be made to keep the cost down by utilising local conditions of stream flow and soil to the utmost.

Following these experiments, which indicated that construction of tanks and sprinkling filters or sand filters would be very expensive, a fine screen was installed, the liquid treated with lime, the lime precipitate removed, and the supernatant liquid used in the process.

In another instance there was constructed a screen to remove coarse suspended matter. The screen effluent was treated with an average of thirteen grains of lime per gallon and two grains of iron per gallon, after which it was pumped to basins having a detention period of 3<sup>1</sup>/<sub>2</sub> days. One-third of the flow was returned to the water supply for transporting beets, the remaining two-thirds was mixed with the flow from a basin containing the Steffen's waste and lime cake, and passed to a settling basin having a 22-hour detention before discharging into the creek. While the effluent from the final basin was dark in colour, the addition of this effluent to the stream caused no complaint. Oxidising processes, which would be required for a more complete treatment, would require a large expenditure.

The lime sludge waste contained for the most part calcium carbonate precipitated from the Steffen's waste, and mixed with enough water so that it could be pumped. The calcium carbonate would settle readily, but the supernatant liquid contained organic solubles, and when neutralised would be putrescible. It might be possible to use the excess of alkali partially to neutralise the acids formed by putrefaction of the battery water. The Steffen's waste consisted of the molasses

from the sugar, as tricalcium-saccharate had been removed by precipitation with lime. It amounted to approximately 300 c. ft. per ton of molasses. This material contained practically no suspended matter, and was very rich in organic soluble matter. The oxygen consuming capacity was very high, about 3,000 parts per million, so that when added to water in a stream, unless suitably diluted, it absorbed the dissolved oxygen, making it impossible for fish to live in the stream.

### Utilisation of Molasses

A summary of technical methods proposed for the utilisation of molasses had recently been published by the U.S.A. Bureau of Standards. It stated: "The molasses contains numerous valuable substances which have never been successfully recovered except in Germany. For many years that country has seen fit to veil its development and discoveries, and to maintain the strictest secrecy regarding the operation of its molasses plants. The scientific literature on the subject is practically barren, so far as actual results achieved in Germany are concerned." The investigators of the bureau had revealed over 1,000 German patents on molasses utilisation and similar subjects. These patents were not listed under sugar or molasses, but were concealed under other subjects. The reviews of the patents showed possible methods of treating the Steffen's waste, but the literature gave no report of the results obtained. The patents indicated that the waste molasses, apart from its use in the recovery of sugar by the Steffen's process, might be used as a fertiliser, a cattle food, a source of alcohol, a medium for the production of yeast, a fuel, a filler in many manufactured products, a source of potash, and various valuable organic and inorganic chemicals. Methylamines, ammonia or ammonium sulphate, sodium or potassium cyanides, nitrogen bodies, such as betaine and glutamic acid, alkali salts ( $K_2CO_3$ ,  $Na_2CO_3$ ,  $K_2SO_4$ ), vegetable carbon, and tar, and various minor products, such as methyl alcohol, glycerin, organic acids, and esters might be recovered, according to the report.

In America, most of the molasses was treated by the Steffen's process or other saccharine processes to recover the maximum amount of sugar. No record had been found of the recovery of organic values other than the sugar. In one case the waste was concentrated and incinerated and potash salts recovered. The expense of the treatment was probably as great or greater than the value of the products recovered, but part of the expense might be charged to waste disposal. If the Germans practised the successful recovery of both inorganic and organic values from the waste, a similar process should be developed as an aid to the industry in the United States. The usual practice for the disposal of Steffen's waste in America was dilution in streams.

### Canada Leads in Cobalt Production

CANADA is the world's largest producer of cobalt, all of which comes from mines in the province of Ontario. Since 1903 about £2,875,000 worth of cobalt and its compounds have been produced. This yield has been obtained almost entirely from the silver-cobalt-nickel ores of the cobalt area. Formerly there were several firms engaged in treating cobalt ores, but at the present time there is only one company on the American continent engaged in the reduction of these ores, the Deloro Smelting and Refining Company, Ltd., which operates a very complete plant at Deloro, Ontario.

In 1924 the estimated Canadian production of cobalt products in the form of metal, oxide, salts, and residues was equivalent to 960,266 pounds of contained metal, for which the producers received £344,584. In the same year 170,513 pounds of metallic cobalt, valued at £78,486, was exported, also 2,421 pounds of cobalt alloys, valued at £2,450, and 490,505 pounds of cobalt oxides and salts, valued at £186,473, making a total value of £267,408. The price of cobalt metal was firm throughout the year at 10 to 11 shillings per pound. The black oxide remained steady at 9 shillings, and the grey oxide at 10 shillings.

Cobalt metal is used in the manufacture of stellite, which is a cobalt-chromium-tungsten alloy used extensively for making cutting tools. It is also employed in making certain kinds of tool steels, and in the manufacture of magnet steels. Cobalt oxide as well as numerous cobalt salts made from the oxide find wide application in the ceramic and enamel industries, and in the production of various pigments. Cobalt salts are also used in electro-plating.

## Progress in Industrial Alcohols

### Herbert Green and Co.'s Prosperity

THE annual general meeting of Herbert Green and Co., Ltd., was held in London on Friday, July 31. The Chairman (Mr. H. D. Lorimer) said that, after providing for all expenses and charges including depreciation, the net profit was £36,165 12s. 7d. From this amount had been deducted the interim dividend paid on March 31, 1925. After payment of a final dividend of 5 per cent. there would be a net balance of £16,047 os. 7d. The effective trading period covered by the balance sheet only commenced ten months ago.

### Plant and Products

Mr. Herbert Green (managing director) said that the firm occupied eight acres of land. The buildings, plant and equipment were specially designed to produce industrial alcohol. They believed the works to be the most up to date in the country. It was the largest individual plant of its kind in Great Britain. The position of the works at Salt End, Hull, offered unrivalled facilities, both in respect of the importation of raw material and the despatch of finished products for the home and export trade. Their raw material, molasses, was imported in tank steamers and was pumped direct into the works. They discharged the steamers at the rate of 150 tons (24,000 gallons) per hour through a ten-inch pipe line. They were erecting additional tanks for the storage of molasses. The new tanks were nearing completion and would provide storage capacity for about 20,000 tons of molasses, which, when manufactured into industrial alcohol, would represent approximately 1,400,000 bulk gallons. The plant and apparatus were flexible and capable of producing alcohol to suit every industry. The equipment in the buildings had been arranged for convenience of control and operation, the elimination of waste, and the conservation of heat by adequate devices, and the saving of labour by automatic controls.

The distillation apparatus provided for the production—in a single operation, and continuously—of the highest grade of commercial alcohol meeting the most exacting requirements, and showing a decided economy of operation, through lower consumption of steam and condensing water, than the discontinuous method usually employed. Economical manufacture of alcohol depended in a large measure upon the possession of a vigorous race of yeast.

### Pure Yeast Culture

The yeast required for fermentation was prepared daily from a pure culture of special yeast. The special apparatus used ensured that the yeast should be produced and multiplied under conditions which excluded absolutely the growth of any undesirable ferments. Besides the marked commercial advantage of increased yield resulting from the use of their pure yeast, the alcohol produced was of finer quality. Their plant was unique in that it was the only plant in the country employing pure culture yeasting apparatus.

Their product enjoyed a high reputation with consumers in the industries which depended upon it. The chief of these manufactures were paint and varnish, lacquers, flavouring extracts, soap, celluloid, ether, explosives, liniments. There was also an extensive demand from cleaning and dyeing boot and metal polish trades. The same might be said of hospital and other medical services. Industrial and mineralised methylated spirits together formed a large proportion of their total sales. They supplied buyers all over the country and were contractors to practically all the Government services. Municipal corporations and railways were good customers. Their relations with H.M. Customs and Excise, whose requirements were notoriously exacting, had been most harmonious. They possessed the great advantage of licensed methylating facilities within the boundaries of their distillery. This they had found to be a valuable business arrangement.

As to the future, they were both well bought ahead as regards raw material, and products were well sold ahead at profitable prices. The extent to which they were selling high-grade industrial alcohol indicated that growing attention was being paid by home consumers, both industrial and domestic, to a commodity which in the U.S.A. reached for non-potable purposes an annual production of some 58,000,000 bulk gallons.

Another important point was power alcohol, which in a

large measure caused the establishment of the company, but which could not yet provide them with a remunerative market. They were, however, keeping themselves closely informed as to all developments and prospects, but there was no effective demand while petrol remained at its present prices. The markets to which they sold were better ones for them, but contingently their intentions were to avail themselves at the right moment, when it did come, of a new demand upon the extent of which no limits could be placed.

Mr. Green said that they had some 700 customers on their books, and the company could quickly double their output without anything like a proportional increase of capital outlay, due to the large reserve of capacity in certain units of the existing distillery.

## British Association of Chemists

### The Question of Registration

Both the profession of architecture and that of dentistry have lately faced this important question, and there are indications that the profession of accountancy will shortly consider the matter. It seems evident, therefore, that where three important professions have concerned themselves with the expediency of this step, the profession of chemistry will have to give the question its close consideration. There is in the case of chemistry a difficulty from which the profession of dentistry, and to a large degree that of architecture, is exempt. In these two professions the great majority of the members are in private practice, so that at the very beginning the question came up for judgment before those who in professional matters would hold, roughly, the same point of view. The case of the profession of chemistry is quite different. The chemist may be an employer, an employee, or a private practitioner, and having regard to the popularity of chemistry with the would-be student, a fourth class, the professor, and academic research worker, cannot be ignored. Upon all administrative matters these groups may, and in many cases do, hold points of view contrary to one another, so that chemistry has first to overcome the lesser difficulties which retard its action in these questions.

The Association is fortunate in representing in its membership all these groups, and there is probably no member of the Association who does not agree that this question of registration should receive the careful consideration of the profession. There is at least one point upon which all must be agreed: the profession is dangerously overcrowded, and some regulative measures of entry into it would do much to relieve the congestion. It is undoubtedly true that, in the case of the employee chemist, it would be impossible to insist that the employers should accept or retain the services only of registered individuals. It might happen that some would insist upon employing unregistered persons; but the fact that the profession refused to recognise them would suffice to make their position extremely difficult. Such a condition of things might for a time prevail, but sooner or later the unprofessional point of view would succumb.

In the matter of the justice of the case we face a different and in some sense a more difficult problem. *Prima facie*, it seems unjust to restrain, in future—it is not proposed, of course, to interfere with those at present in practice, provided that they are prepared to fulfil certain reasonable conditions—those who have up to now entered the profession without let or hindrance, but it is not in the interests of one side only that new regulations are suggested. To enter the profession of chemistry through the medium of some kind of apprenticeship is now, to say the least, a dangerous proceeding, since competition is such as to make the possibilities of obtaining a post very remote, but there is still not an inconsiderable minority who do not realise this. Registration would not only automatically reduce the number of those entering the profession, but it would make this hazardous type of enterprise impossible. It is not unreasonable to maintain, therefore, that far from being unjust such regulations would benefit all concerned. Some means by which entry into the profession can be regulated are undoubtedly necessary, but before making any official pronouncement the Association desires to obtain more data. It appeals to all chemists qualified to do so to join its ranks, so that it may be possible for the profession to show, at the appropriate time, a united front concerning this and kindred questions.

H. T. F. R.

## Germany's Aniline Dye Industry

### Great Losses in Foreign Countries

THE prejudicial influence exercised on the export trade of Germany in aniline dyes through the development of the production of these materials in Great Britain, the United States and other countries in recent years is dealt with in the course of three articles in the *Deutsche Bergwerks Zeitung*. It is there shown that, as compared with 1913, regarded from the standpoint of the tonnage of the exports, the German dyestuff industry has now lost 65 per cent. of its former trade in Europe and 56 per cent. of its transmarine trade. These facts are of sufficient importance to warrant a closer examination of the question. Dealing first with the situation as it applies to Europe, Dr. Kurt Wimmer, of Dusseldorf, states that out of the total German production of about 80,000 metrical tons in 1913, four-fifths were disposed of in the markets of the world, this quantity satisfying 75 per cent. of the world's requirements. Out of the total exports of 60,000 tons a quantity of 31,600 tons were sold in Europe, Great Britain occupying the first place with purchases of 11,000 tons or over 33 per cent.; Austria Hungary came second with 18 per cent.; Italy third with 13 per cent.; and Belgium fourth with 8 per cent. of the total Germany exports. Deducting the imports in 1913, Germany had an active balance in aniline dyes amounting to 29,049 tons, of the value of 67,321,000 marks (£3,366,000) in so far as the European countries alone were concerned.

### Post-War Fluctuations

As a result of the changes brought about by the war, including the expansion of national production in other countries, the German exports, which in post-war years reached the maximum of 15,257 tons in 1922, declined to 11,464 tons in 1923 and to 9,832 tons in 1924, while the quantity in the first three months of 1925 was only 2,144 tons. At the same time the German imports of similar products, which were only 2,552 tons in 1913, amounted to 103 tons in 1922, to 59 tons in 1923, and to 83 tons in 1924, but in the first three months of 1925 they rose to 203 tons. A statement given by the author shows that as contrasted with 1913 Germany had for a large part lost the markets in Western Europe in 1923, particularly Great Britain, Belgium, and France, and no material alterations in this respect took place in 1924. On the contrary, instead of an improvement having arisen, matters have become worse. Under these circumstances Dr. Wimmer remarks that it is not to be assumed that the native industry would be able to make special progress in this direction in the next few years, especially as the works would put forth every effort to prevent foreign competition arising in the German home market. The total losses in Europe as compared with 1913 are put at 65 per cent. of the exports.

### Exploiting Open Markets

On the other hand the losses have been compensated to a slight extent by an extension of business in the open markets in the South East and East of Europe, especially in Russia, Roumania, Finland, Bulgaria, and Greece, where a monopoly for the Germans is claimed to exist. The conditions as a whole have brought about the situation that the sales policy of the German dye community in recent years has taken a more easterly direction, and the trade returns for the first quarter of 1925 point to the importance of these regions for years to come. During this period the total sales in Europe amounted to 2,144 tons, of which 1,540 tons were sent to the Northern countries, Austria and Hungary and the Eastern and Southern countries.

### Decrease in Overseas Exports

Dr. Wimmer states that the transmarine exports in 1913 absorbed 31,806 tons, the United States having been the chief purchaser at 13,855 tons in 1913, with China second at 8,461 tons, British India third at 3,822 tons, and Japan fourth at 3,500 tons. If the insignificant imports were deducted, the German dye industry had an active trade balance of 31,782 tons, of the value of 68,854,000 marks (£3,442,700), in 1913 in the case of transmarine countries alone. Since the end of the war the active trade balance had been as follows: 1922, 17,178 tons; 1923, 16,320 tons; 1924, 12,187 tons, while in the first three months of 1925 the active balance was only 1,753 tons.

The imports from transmarine countries amounted to 23 tons in 1913, 75 tons in 1921, and 331 tons in 1922, but since then imports had ceased.

A statement quoted indicated that the German dyestuffs industry had for the most part lost the market in the United States, the exports to that destination having fallen from 13,885 tons in 1913 to 373 tons in 1923. In fact, the exports to all countries, with perhaps the exception of Argentina, had diminished. In 1924, a further contraction of the exports took place.

Dr. Wimmer proceeds to state that sale conditions in 1925 have become still more unfavourable, the transmarine exports having amounted only to 1,754 tons in the first quarter, which, added to the exports to Europe, totalling 2,144 tons, make a total of 3,898 tons for all destinations.

### Serious American Competition

Dr. W. Fleming, of Dusseldorf, submitted that the competition of the United States dyestuffs industry, which in 1923 produced 96 per cent. of the native consumption of dyes, and also exported a quantity of the value of many millions sterling, was far more important than the rivalry of the British industry. In the former was invested an enormous amount of capital, and it had a highly protected inland market at its disposal, which rendered possible dumping on a great scale. Reference was made to the Chinese market, for which the greatest trade contest was taking place, and where the Americans were said to have declared that they were at any time prepared to undercut German prices. The only way in which the German dyestuffs industry could beat foreign competition, in the opinion of Dr. Fleming, lay in reducing the costs of production and in the improvement of the methods of production. The synthetic manufacture of raw materials promised increasing success. Thus it had in recent times been possible to produce methyl alcohol, which found use for the production of the most varied kinds of dyes, and which had hitherto been obtained through the dry distillation of wood synthetically by means of a special process. The artificial production of methyl alcohol was much cheaper to produce than by the process of dry distillation, and this is of great importance to the United States, which produces and exports large quantities of this alcohol. It was now impossible for the Americans to compete with the German article, which was a by-product of the fixation of nitrogen, so that the prime costs were extremely low. Now the American distillers of wood alcohol had asked for an increase of 50 per cent. in the import duty on methyl alcohol, but it remained to be seen how that matter would develop. In the meantime, Dr. Fleming states that the American distillers sell at 70 cents per gallon, whereas the German price was only 35 cents.

### America's Perfume Trade

THE first months of 1925 were characterised by extremely mixed movements in the U.S. markets on the primary materials of the perfumer and others employing floral essences and essential oils, according to Ungerer and Co. (Inc.), New York.

The general price level has been fairly steady when averages are considered, but individual products have advanced sharply, while others have declined with equal sharpness, and many developments have occurred in the primary markets, which will be of the utmost importance in influencing the future trend of prices.

Business, which was extraordinarily good during the early part of the year, quieted down with the approach of spring, but not alarmingly, and is at present running at a good volume, with every prospect of substantial improvement later in the year. Pessimism is unjustified, and is being indulged in only by those with a natural inclination in that direction, and by those individuals who never think business is good unless it is abnormally so.

Few causes of alarm are in sight for the consumer of scenting and flavouring materials. A normal and improving outlet for his products seems to be assured, while on the other hand, except in a few minor instances, no shortage of supplies is looked for. Improving demand may easily result in a rising price level on many essential oils.

## A Proposed International Benzol Combine

### German Lead in Negotiations

As is reported by Essen newspapers, the Benzol Verband of Bochum has recently been in negotiation with benzol producers in England, France, and Belgium with a view to an arrangement for the regulation of the inland markets in these countries, simultaneously with that in Germany as undertaken by the Bochum Verband. The negotiations in the case of England have been conducted with the Association of Benzol Producers. In France there exists a benzol syndicate, but it is not rigidly organised and therefore does not exercise any great influence in the market. On the other hand, no combination exists in Belgium, and negotiations have consequently had to be undertaken by the German syndicate with a number of large and also smaller manufacturers of benzol.

No definite arrangements have been fixed, but what the Germans aim at is to secure that the quantities of benzol imported into each country concerned should be imported by the associations in each country and distributed by them, so that a rigid syndication of the inland market and perhaps also a price monopoly would be obtained.

As a result of the increasing use of benzol in a pure or mixed form the producers of benzol reckon with an approaching hardening of the markets, so that, even in the event of the failure of the negotiations for an international understanding, the existing price cutting practised by foreign firms, especially in regard to French and Belgian benzol on the German market, will be diminished or will entirely cease. The German interests do not intend to seek to bring about any arrangements of a similar nature in countries other than those mentioned, as the difference in conditions would appear to render such arrangements impossible. The managers of the Benzol Verband regard the negotiations, which are being continued, as promising, although a definite result will probably not be achieved in the immediate future.

The Benzol Verband announces that the production of the associated works amounted to 94,000 tons in 1924, of which 75,000 tons were sold and the balance disposed of by members of the association in their individual capacity, according to the terms of the new agreement. The report states that in the first half of 1924 the price of benzol remained on the level of that of heavy benzene, but it subsequently rose to the price of light benzene in October, and, further advancing, it surpassed the latter by 20 per cent. at the end of the year, although this difference has not been maintained in the present year. A large fall in the prices of benzene has taken place this year simultaneously with a large expansion in the imports of benzol into Germany.

## Germany's Economic Position

### Currency Policy

At a meeting of the National Association of German Industry which took place at Cologne recently, Dr. Schacht, President of the German Reichsbank, made an interesting speech, in the course of which he said the German exchange was stable and would continue stable. The object of the German currency policy was to maintain the gold cover of the Reichsbank notes and to provide a sufficient quantity of such fully covered banknotes for the requirements of their economic life. It was the duty of the Reichsbank to preserve the gold value of the notes in circulation, and for that reason it could not comply to a greater extent than hitherto with the wishes of industry for placing still greater credits at its disposal. This rendered imperative a policy of limitation of credits, and the Reichsbank had to add another defensive measure to that of fixing the discount rate, namely, the so-called allotment of credits. Notwithstanding the restraint which the Reichsbank must exercise in granting credits, the sum total of the credits which had been extended, partly direct through the Reichsbank, and partly through the other currency institutions, was by no means inconsiderable. At the middle of June the Reichsbank had extended credits to the amount of 1,400 million marks and the Rentenbank to the amount of 570 million marks (apart from the credits to the Reich); private issuing banks had credits running to the extent of 220 million and the Gold-discount Bank to the extent of roughly 100 million. He considered this the maximum bearable at the time, unless industry provided a better cover for the amount of banknotes in circulation.

Unemployment was also a heavy burden on industry. The number of unemployed in Germany was two hundred thousand, but it had to be remembered that the burden on the German industry due to lack of employment was very much greater, because the entire cost due to the retrenchment of government, municipal, and private company officials and the pensions had also to be borne by industry. Accurate figures in that direction were only available for small portions of their economic system. For instance, the German railways in 1913 paid only 17 marks pensions for every hundred marks paid in wages or salaries, whereas in 1924 the percentage was 37. In 1925 the number of officials on active service of the railways amounted to 339,000 and there were 230,000 pensioned officials, including widows and orphans, which meant that for every three officials employed there were two unemployed individuals entitled to support.

The Dawes Report was an earnest and considered attempt to remind the rulers of the world of their economic responsibility upon which depends the material and spiritual welfare of their peoples. Europe could not be saved from Bolshevism and chaos unless this feeling of common responsibility was shared by all the leaders of the different nations. An attempt to represent the figures of the Dawes plan as impossible at such an early stage might blunt this feeling of responsibility. It was, therefore, well to remember that the Dawes Report stated plainly that its estimates were based on the assumption that Germany's economic activities were not to be hampered or curtailed by any foreign organisation other than the measures of control provided in the Report. He was thankful to say that more especially English and American bankers still had confidence in Germany, notwithstanding her difficult position.

## Meshless Filters

### The Problem of Dust Recovery

THE recovery or filtration of dust from gases in chemical and metallurgical work is a problem which has always called for the serious consideration of chemical engineers. In many cases the problem has remained unsolved, as the effect of the acid on the filtering medium is difficult to counter, and the loss of much valuable dust has resulted. However, a system is being introduced at the present time into this country, the invention of Mr. Louis B. Fiechter, of Basle.

In his system a meshless filter is used, of which there are two types. In the one type Mr. Fiechter employs a dust-free granular material, such as quartz sand, which is carried on an endless band of sectional sieves travelling at a slow speed and interposed between the dust source and the exhaust fan drawing the gases through. As the travelling band emerges from the dust chamber it casts off its load over a fixed sieve, the dust falling through to be collected and the granular material passing over to be returned by a suitable worm conveyor to a hopper at the other end of the band. From here it is fed once more on to the band to commence again its work as a filter. The action is continuous, and, as the filter is being regularly cleaned and renewed, under normal conditions of work the results obtained remain constant. In the other type a meshless textile filter of fine cotton or of a special form of asbestos wound on a frame is used. These frames are placed at a fixed angle in separate chambers arranged side by side, the number depending upon the volume of gases to be filtered, and situated again between the dust source and the exhaust fan. By a suitable contrivance the strands are shaken at regular intervals, one chamber at a time being shut off while the shaking gear operates.

Both of these filters are capable of working under conditions of considerable heat, and are now in use on the Continent in a number of works, where efficient results are being obtained. Messrs. Emil Fiechter, 17, Brunswick Street, Liverpool, who are the appointed agents for Mr. Louis B. Fiechter, state that in several cases brought to their notice over 95 per cent. of the dust in suspension on the inlet side has been caught by filters of this description, resulting in a valuable saving to the owners. A plant of this kind is easily extended to suit any increased emission of gases, free from any danger of fire or explosion, and works automatically with only the smallest amount of personal attention.

### Indian Chemical Notes

[FROM OUR INDIAN CORRESPONDENT.]

As the prickly-pear problem in Southern India is of great importance, various attempts have of late been made to solve it by utilisation. The Department of Organic and Applied Chemistry of the Indian Institute of Science, Bangalore, under the direction of Dr. Gilbert J. Fowler, undertook recently the study of the problem. The investigations were concerned chiefly with the possible uses of prickly pear as a source of alcohol and as a fertiliser. The experimental work fell under three heads: the microscopical and chemical examination of prickly pear, both of the wild and spineless varieties; the fermentation of prickly pear by various organisms under different conditions; and the study of the changes taking place when prickly pear is mixed with soil, especially in reference to nitrogen fixation. The greater part of the work was carried out with wild prickly pear growing near the Institute. For some years, however, Dr. Fowler had been attempting to grow a variety of spineless cactus obtained from the Agricultural Department at Lucknow in order to see whether it could be cultivated in dry barren soil like the spiny varieties, and so afford fodder for cattle in times of drought. No great success was obtained until a certain amount, though small, of water and manure was applied to it. The opportunity was therefore taken in connection with the present research of examining further the conditions of growth and the composition of spineless cactus. In addition to the Lucknow plant, four other varieties, not very strictly defined, were obtained through the courtesy of Mr. Huidekoper, Head of the Department of Agriculture of the National College, Madras.

The results of the experiments showed that sufficient material fermentable by yeast is not present in prickly pear, nor can be produced from it by acid hydrolysis, to make it of any value as a source of power alcohol. The fruit, on the other hand, contains fermentable sugar, but successful fermentation of the fruit will largely depend on its actual sugar content and on the cheapness with which it can be collected and transported to the distillery. At any rate, it is very unlikely that it will compete with other cheap raw materials as a source of alcohol. While prickly pear readily ferments spontaneously, both under aerobic and anaerobic conditions, yielding butyric acid, hydrogen, and marsh gas, no success has attended attempts to produce acetone from it by a pure fermentation with the acetone bacillus. Prickly pear is a valuable source of energy for the nitrogen fixing organism, provided sufficient carbonate of lime is present to neutralise all acid formed, and several varieties of spineless cactus can be readily grown in Southern India with a very small provision of water or manure. Of water-soluble material and nitrogen they contain a higher percentage than the wild spiny species.

S. G. W.

### New York Chemical Exposition

#### New Chemical Products

ABOUT twenty leading American colleges and universities have filed applications for their students of chemistry and chemical engineering to take the one week course of training in the technique of chemical engineering to be held in conjunction with the Tenth Exposition of Chemical Industries at the Grand Central Palace, New York, during the week of September 28 to October 3. More than three hundred students are expected to enroll before the closing date. Examinations will be held at the close of the course, as number of colleges have intimated their intention of giving their students credit toward their degrees for work done at the Chemical Exposition. Professor W. T. Read, of the Chemistry Department of Yale University, is in charge of the course.

Many entries for the Court of Chemical Achievement, to be held in conjunction with the Exposition, commemorating notable discoveries and achievements in American chemistry over the past few years, have been passed by the approval committee of the American Chemical Society, and accepted for the Court. All accepted exhibits have been strictly of American development in the field of chemistry or chemical engineering. Some of the chief entries accepted include four colours and dyes, two rubber accelerators, duco, tontine, fabricoid, low freezing explosive, and a special shotgun

powder, all by the Du Pont Co.; germanium dioxide made commercially, spectroscopically pure cadmium and zinc by the New Jersey Zinc Co.; six new products from the Chemical Warfare Service; permalloy for high speed submarine cables by the Bell Telephone Laboratories; commercial metallic tantalum by the Fansteel Products Co.; fibrin, haemoglobin, and serum albumin by the American Protein Co.; catalytic oxidation of benzene to maleic acid and its derivatives by Weiss and Downs; tetraethyl lead by the Ethyl Gasoline Corporation; crodon, a special plating alloy by the Chemical Treatment Co.; bakelite by the Bakelite Corporation; 259 special organic chemical products by the Eastman Kodak Co.; recent chemical development of special optical glass by Bausch and Lomb Optical Co.; chemical development of Pyrex glassware by the Corning Glass Works; ethylene for colouring citrus fruits, fireproof fumigation of grain against weevil, and the preparation of invertase by the Bureau of Chemistry; thyroxin by the Mayo Foundation; karolith and its development from casein by the Karolith Corporation and others.

A chemical industry dinner with twelve hundred in attendance, and with General Pershing as the chief speaker, is being arranged to be held in New York during the week of the Exposition. The Chemical Warfare Service Association, of which Dr. Charles H. Herty is president, has sent invitations to other chemical associations to join with the Chemical Warfare Service group in the dinner.

An industrial directory of exhibitors at the Exposition is now being compiled under the direction of the Exposition management.

### Forced Draught Furnace Developments

THE world slump in coal affects other countries besides Great Britain, but it is not generally realised that two reasons for this are the improved scientific methods now beginning to be used extensively in the burning of coal and the increased use of refuse and low grade materials hitherto wasted. As an indication of the above tendencies we have the considerable developments now taking place in the organisation connected with the "Turbine" forced draught furnace.

A new German company, the Deutsche Turbinen Feuerung, has been formed with head offices at 27, Hohenzollernstrasse, Dortmund, and many furnaces have already been installed in Germany in the colliery and other industries, following upon a display of the "Turbine" furnace at the recent Cologne Fair, whilst both the Compagnie Française de Foyer Turbine, 54, Rue de Clichy, Paris 9E, and the Compagnie Continentale des Foyers Turbine, 20, Rue de l'Eveque, Brussels, have been reorganised and the staffs considerably enlarged.

With regard to refuse fuels, some time ago the Mines Domiales Françaises du Bassin de la Sarre, which, under the Treaty of Versailles, were ceded to France by Germany for 12 years and are amongst the most important in Europe (covering a vast area of territory to the South-east of Metz), ordered 89 "Turbine" furnaces to burn the vast heaps of refuse fuel, estimated at 1,250,000 tons, that had accumulated at the pit-heads for a number of years past. Another important development is that the "Turbine" furnace will burn raw lignite direct for steam generation on ordinary cylindrical boilers, as proved both in France and the Malay States, and this is particularly valuable to Belgian engineers because it will enable the native lignite of the Belgian Congo to be used instead of expensive imported coal and oil.

A further interesting example out of many that could be mentioned is the utilisation in Chili, on a nitrate plant, near Antofagasta, of a quality of coal that has the high grade analytical figures of 45.92 per cent. fixed carbon, 44.49 per cent. volatile matter, 7.13 per cent. ash, and 2.46 per cent. moisture with 13,275 B.Th.U. per lb., but is extremely difficult to burn in normal circumstances because of unusual friability, in addition to containing 3.26 per cent. of sulphur.

It may be stated also that the "Turbine" furnace is being exhibited again this year at Wembley, in the Colliery Hall, adjoining the model colliery, and there is on view a full-sized front, 8 ft. diameter, of a "Lancashire" boiler containing a "Turbine" furnace equipment complete on the latest lines in both furnace tubes, in addition also to an installation of the "Vulcan" mechanical steam jet boiler flue cleaner.

## Pulverised Fuel and Furnace Problems

(FROM A CORRESPONDENT.)

PULVERISED fuel firing for steam generation is occupying a great deal of attention just now, and it is perhaps not generally realised that the solution of the difficult problems of burning solid fuel in a very fine state of division is only another reason why we should submit the greater part of our coal to low temperature carbonisation. Mr. Brownlie, in his paper "Pulverised Fuel and Efficient Steam Generation," read before the Institution of Electrical Engineers, has dealt in full detail with the latest methods employed, which have led to such a striking advance in the use of pulverised fuel, especially as regards steam generation. The crushing, drying, and pulverising of fuels presents no difficulties at all, especially with the invention of a simple new vertical gravity dryer, using only a portion of the waste chimney gases mixed with air and circulated through the coal, and the use of modern roller pulveriser mills with automatic separation of the material, when of the required fineness, by means of a current of air. The extent of the grinding is generally represented by 90 per cent. through a 100 mesh (100 holes to the linear inch = 10,000 holes per square inch) and 65 per cent. through a 200 mesh, and it may be stated that over 30,000,000 tons of coal per annum is now being used in the pulverised condition.

### Low Temperature Fuels

The chief problems have been, however, in connection with the furnace. Because of the intimate contact of the air and the fuel the combustion is carried out with only about 20 per cent. excess air over the theoretical, and as a consequence the heat is so intense that no ordinary furnace will stand it. In the case of low temperature fuels, "Coalite," as is well known, when in the ordinary solid condition, burns with a much higher emission of radiant heat than ordinary raw coal, the ordinary household grate figures, for example, being 35 per cent. radiant efficiency for "Coalite" and about 20 per cent. for coal. Consequently, the use of pulverised "Coalite" would result in a higher furnace temperature even than coal. The modern methods used to counteract these difficulties consist essentially in the use of a furnace of much greater cubic capacity than usual, hollow air-cooled brickwork, with the use of the heated circulating air in the combustion chamber, and the water screen, a series of 4 in. steel tubes, water cooled, in the bottom part of the furnace to prevent "slagging," the melting of the ash. As a consequence, the brickwork is now guaranteed for three years, and there is nothing to prevent "Coalite" in a pulverised condition from being used at the maximum rating without any fears due to the high efficiency of the combustion. "Coalite," prepared under the latest conditions, as represented by the extensions now being carried out at the Barnsley plant, contains about 8 per cent. volatile matter, and is a particularly easy fuel to burn in a pulverised condition. The point is, therefore, that low temperature carbonisation can now be applied to almost any grade of coal without the necessity of blending. The good qualities would be used for the production of the ordinary hard solid "Coalite" for smokeless household fuel and smaller steam boilers, whilst the inferior qualities can be converted into "Coalite," with the separation of all the valuable by-products, which would be pulverised at once and burnt for steam and power generation under water tube boilers.

### By-Product Coke in Canada

As a result of its investigation, and as a means of securing independence in the matter of domestic fuels, the Dominion Fuel Board of Canada advocates the erection of a number of by-product coking plants at strategic points in Ontario and Quebec. With the rapid depletion of the oil reserves of the world, the demands of Canada for suitable fuels are becoming more and more insistent, and it is believed that future demands in this direction will be economically met by by-product fuel. From a commercial standpoint, it is thought that by-product coking plants can be successfully introduced into Canada. Markets, with the exception of gas, exist in far greater extent than can possibly be supplied. With attractive returns to capital, coke and gas can be produced and sold at very fair prices. Anthracite producers will abandon the Canadian

field only with great reluctance or under pressure, because it is their most dependable market. Therefore, it becomes evident that as both gas and coke are in steady demand for domestic purposes, the industry will be almost free, if not entirely so, from fluctuations in business due to industrial depressions.

### A Court of Chemical Achievement

BETWEEN seventy-five and eighty applications for the Court of Chemical Achievement, to be held in conjunction with the Tenth Exposition of Chemical Industries, at the Grand Central Palace, New York, during the week September 28 to October 3, have been received and most of them have been submitted to the Approval Committee of the American Chemical Society. Preliminary consideration of some of the applications, which are for new chemical products, instruments, equipment and new processes developed in the United States during the past few years, indicate that a few will probably not be accepted. The majority, however, are expected to secure admission, although the final decision one way or the other rests with the American Chemical Society Committee.

In connection with the present industrial boom in the South, the Southern Section of the Chemical Exposition bids fair to be one of the largest groups this year. A number of leading chemical and allied companies, railroads, and power corporations will have exhibits. Among some of the leading firms in this group will be the Tennessee Copper and Chemical Corporation, the Federal Phosphorus Corporation, the Southern Talc Corporation, the Southern Minerals Corporation, the Southern Railway System, Seaboard Air Line, North Carolina Department of Conservation, Manufacturers' Record, and a number of prominent power companies.

### Commercial Practice

Up to the present time something over twenty-five American universities have filed entries of chemistry students for the course for students in commercial practice of chemical engineering to be held for the second time at the Chemical Exposition this year, under the direction of Professor W. T. Read, of Yale University. A number of colleges have indicated that they will give credit to students attending the one week's course at the Exposition, in their regular work in chemical engineering. The general lectures and examinations will be on the practical phases of actual chemical plant work, with leading authorities in the technical world giving the lectures.

Reports from the Chemical Exposition management state that the entire first and second floors of the Grand Central Palace have been contracted for by exhibitors, while a large portion of the third floor is already taken. Total exhibitors to date indicate that this year's Chemical Exposition will be one of the largest industrial expositions ever held in the United States.

### A New Synthetic Petrol Process

A LARGE synthetic petrol factory to be worked on Dr. Erwin Blumner's new process will be started in Switzerland shortly.

In the new process the crude oil is pumped under pressure into molten metal, bursting upwards through a special tube which is fitted so as not to touch the walls of the reservoir. There can thus be no partial superheating of the walls resulting in the separation of coke. The fundamental principle of the Blumner process is thus the substitution of molten metal for the usual rigid heating surface, according to the *Manchester Guardian Commercial*. Whereas huge boilers or pipes many hundreds of feet in length were required for the heating of large amounts of liquid, which, of course, entailed the use of many connections exposed to danger in the large fire area, the Blumner process produces the same effect in compressed-air reservoirs stamped from a single piece, and having a heating area about twenty times less. This, in conjunction with the fact that the reservoirs in the fire area never come into contact with the liquid to be heated, thus excluding any coking and overheating of the walls, warrants an extremely long life.

These reservoirs are mainly destined to create a petrol industry in countries possessing raw materials more or less difficult of treatment—tars from lignite, oil from shale, and products of low-temperature distillation.

## Water Sluice Ash Conveying

### A New Method

ONE of the most difficult problems in connection with steam and power generation is the mechanical conveying of ash and clinker from steam boiler furnaces. For this reason most industrial boiler plants, whether in chemical works or elsewhere, have no mechanical method of ash handling, even if mechanical stokers are installed. The most efficient principle, however, in this connection is undoubtedly that of water sluice conveying, in which the red hot material is dropped direct from the ash hopper of the stokers into a closed sluice of water. This may be on the intermittent principle with stagnant water swilled out, say, every hour, but generally continuous methods are adopted, either a chain and scraper conveyor under the water or the travel of the water itself in a complete circuit, the quenched ash and clinker being deposited in a concrete tank full of water. A number of plants according to all these methods have been supplied by Messrs. The Underfeed Stoker Co., Ltd., of London, and a fourth and entirely new application of this general principle has now been devised by them. The first plant on these lines is now in operation at the St. Marylebone Electricity Station, and is of great interest to all steam users because it is equally applicable to cylindrical as well as water tube boilers.

The method consists essentially in discharging the material as usual direct into a closed sluice, through which a continuous and rapid circulation of cold water is maintained by means of centrifugal pump, but the mixed ash and water passes right through the pump itself and is discharged to an overhead ash tank. This has a perforated bottom, and the water returns to the circuit by draining through to a suction tank in the basement, which supplies the pump suction pipe. The ash rapidly accumulates in the tank, which is divided into two parts, each holding 40 tons of ash, and railway wagons are backed under at convenient intervals, being filled by opening a valve. With ordinary "Lancashire" boilers the water sluice conduit would be under the foot plates in front of the boiler, and the water circulated by the pump only when the ash and clinker were being cleaned out of the fires, the quenched material passing through the pump and being discharged through a vertical pipe to an overhead ash tank.

In this particular installation at Marylebone the centrifugal pump used has a solid manganese steel impeller and the casing is lined with the same highly resistant alloy, having been supplied by Messrs. Blackstone and Co., Ltd., of Stamford. The suction pipe is 8 in. diameter and the pump will take without difficulty pieces of ash and clinker up to 8 in. cube, working at 750 revs. per minute and circulating 900 gallons of water per minute through the entire circuit, being direct driven by a "Lancashire Dynamo" motor capable of developing 100 H.P. The amount of ash handled is guaranteed to be 20 tons per hour and in practice this has been far exceeded, very nearly double the figure being obtained if necessary, and there is stated to be little or no wear and tear on the pump, which is of the usual character supplied for difficult liquids containing solid matter in suspension.

### Protection of Inflammable Liquids

THOSE who are engaged in the manufacture, use, or storage of liquids which come under the category "highly inflammable" will be interested to learn that it is possible to protect them at a comparatively low cost by means of the foam method of fire extinction. About ten years ago the Foamite Firefoam Co., of 24-26, Maddox Street, London, introduced Foamite Firefoam, which was soon adopted by many oil companies to protect their oil storage tanks. The foam is sufficiently stable to withstand heat, friction and rough usage generally, and is produced by the mixing of two chemical liquids which are kept apart in suitable containers until required for use. The result of mixing is their expansion into foam—the expansion being as much as eight to ten times the volume of the combined solutions; that is to say, 100 gallons of solutions would produce from 800 to 1,000 gallons of foam. The foam, which consists of minute bubbles charged with carbon dioxide, is lighter than all liquids, and consequently floats upon them, with the result that when they are on fire the foam acts as a blanket, cutting off the access of air to the burning surface. In the standard hydrant installation three hose sets are usually provided.

## A New Hydraulic Gypsum Cement

### Manufactured in Britain

DETAILS are now available of a new hydraulic gypsum cement of British manufacture. This cement, which is known as "Astroplax," is produced by a process in which gypsum is so manipulated as to result in a condition isomorphous with dehydrated calcium sulphate, as obtained by any other process in the treatment of gypsum for the production of cement or plaster, but isomeric and/or polymeric, as the case may be, with these in many new and improved properties. The resulting product is a definitely hydraulic cement that cannot be "killed" by excess of water injurious or fatal to the gypsum cements or plasters of other processes. In addition, its spreading capacity is said to be at least twice as great as that claimed for other forms; it persists in resetting when disturbed or broken down any number of times; sea-water sand may be used with it; and no salt, fungus or other disfigurement develops on the surface of the work; while it amalgamates in intimate and permanent conjunction with Portland cement, either in bonding or as a mixture.

### Various Uses of the Product

Astroplax is prepared by being "run" into a cistern, very much in the same manner as common lime for "putty"; it may be so contained for an indefinite period and removed and returned as may be required. New stuff may be added to old batches, and may lie on a plaster-board for hours, and at the end of a day's work any left over may be returned to the receptacle and applied later. Interiors of houses may be first and second coated and finished on successive days, and decorated with paint or paper within the next forty-eight hours. With suitable sand as an aggregate, exteriors may be plastered in imitation of any approved building stone and in any style of masonry. The material may be used for all sorts of indoor and outdoor work, either as a plaster or as a cement. The vitality of the new material has been severely tested, and all the claims for it have been substantiated. The process of manufacture has been developed by Mr. Frank Mulligan, a Belfast inventor, and Mr. Robert Robertson, Glasgow, whose experimental work has extended over two years, and who have already made and sold large quantities of the material. A syndicate has been formed for the purpose of establishing the manufacture of the cement in all likely countries. This syndicate is represented in Glasgow by James Miller, Son and Co., Ltd., 79, West Nile Street.

### Sodium Peroxide

"SODIUM PEROXIDE" is the title of an interesting booklet issued by the Castner-Kellner Alkali Co., Ltd., 257, Royal Liver Buildings, Liverpool, dealing in a concise fashion with the firm's "Seekay" brand of sodium peroxide. There is given first a short résumé of the history and general scope of application of this well-known chemical product, whose main use, of course, is that of bleaching numerous fine products liable to be injured by other methods. Typical are hair, feathers, fur, straw and grass, sponge, ivory, horn, silk, bone, and many similar products.

Then follows a description of the properties of sodium peroxide, and detailed instructions as to the method of application. It is strongly recommended that when a neutral solution is necessary, the strongly caustic reaction should be neutralised with hydrochloric acid, which must be of reasonably good quality and free from iron. Generally a strong solution of about 40 lb. of sodium peroxide in 100 gallons of water is prepared for addition to the bleaching bath, and in this connection another advantage of hydrochloric acid is that it only evolves about two-thirds of the heat of reaction as compared with sulphuric acid.

The final bath is made very slightly alkaline before use, and the firm recommend for this purpose silicate of soda, although borax, trisodium phosphate, and ammonia have been employed, as well as also a little extra sodium peroxide.

Instructions are given as to the carrying out of a simple method of testing the strength of the bleaching solution, depending on titration with standard potassium permanganate solution; and, finally, there is a short description of the plant to use for sodium peroxide bleaching, and a series of tables. This is decidedly a useful publication, and contains a good deal of practical information.

## Decomposition of Hydrocyanic Acid

### Some American Investigations

In a paper by Messrs. Mark Walker and D. N. Eldred, at the Los Angeles meeting of the American Chemical Society, it was stated that the storage of liquid hydrocyanic acid containing 96 to 98 per cent. hydrocyanic acid presents a unique problem alike to manufacturer, transportation carrier, and consumer. Numerous explosions have occurred in attempting to store the liquid confined in closed containers. During the past few years large quantities of this commodity have been manufactured, transported over the public highways, and stored in warehouses or specially constructed sheds for indefinite periods of time. Because of the high toxicity of the materials to nearly all forms of life, and the violence of the explosions, it became increasingly important to determine the nature of the causes of these explosions.

A study of the behaviour of liquid hydrocyanic acid, confined in steel bombs under controlled temperatures and pressures, alone and in the presence of "catalysts" and "stabilisers," has been made. In this study, time-temperature, time-pressure curves, and the character and composition of the products of the reaction have been determined. As a result of this investigation the explosions were found to result from the rupturing of closed containers due to the formation of gases caused by the exothermic polymerisation and decomposition of the liquid. Pressures of over 1,000 lb. per square inch were frequently experienced in this work. At atmospheric temperature, polymerisation without a sudden rise of pressure may result owing to the balance established between the heat of reaction due to decomposition and the loss of heat by radiation. The products of the reaction were found to be: (1) a solid black mass resembling willow charcoal or powdered carbon, which upon analysis proved to be a polymer of hydrocyanic acid slightly deficient in hydrogen and nitrogen, and (2) various gases, among which ammonia and carbon monoxide predominated. Gaseous mixtures of hydrocyanic acid and air varying from 11 per cent. to 60 per cent. of hydrocyanic acid by weight will explode when ignited. It is believed, however, that the explosions referred to in this work do not belong to this class.

### Canadian Metal Production

THE production of nickel taken as the nickel content of the nickel-copper matte produced in Canada during 1924 was 69,276,313 lb. as against 62,057,835 lb. in 1923. The nickel recovered from the treatment of the silver-cobalt ores amounted to 260,037 lb. During the first half of the year three companies—the International Nickel Company, the Mond Nickel Company, and the British American Nickel Corporation—were in operation, but the British American went into liquidation in July, 1924. Shipments of hand-sorted ore from the mines to the smelters amounted to 1,354,650 tons during the year. The smelters treated 1,307,604 tons of ore during the year, an increase of 167,534 tons over 1923, and the matte produced amounted to 65,944 tons as compared with 58,084 tons during 1923.

Two refiners, one operated by the International Nickel Co., Ltd., at Port Colborne, Ont., and one by the British America Nickel Co., Deschenes, Que., received 34,428 tons of matte and treated 37,613 tons. The refinery recovery of metallic nickel and nickel in oxide made amounted to 34,895,975 lb.

Bismuth was reported for the first time in Canada's mineral production for 1924. This metal occurs in the silver-cobalt ores in small quantities, and in their treatment it was allowed to build up in the lead and silver bullion until it reached a marketable percentage. Shipments of this metal reported for 1924 amounted to 12,863 lb., valued at \$16,079. No production of chromite or tungsten was reported for 1924.

Manganese has never been mined to any large extent in Canada, but during 1924 shipments amounting to 584 tons, valued at \$4,088, were made from New Brunswick to Quebec. Molybdenite production in Canada reached its peak during the war years, but from the year 1920 until the year 1924 no production was recorded. During 1924 the Moss mine at Quyon, Que., shipped 6.5 tons of concentrates, valued at \$6,606.

The increase in 1924 over 1923 in nickel production was reflected also in the increase of platinum and its associated metals.

## Salt Mining Possibilities in Canada

As Canada at the present time imports nearly half of her annual consumption of salt, and as 98 per cent. of her present production is from south-western Ontario, the possible workable reserves of rock salt in the maritime provinces are worthy of attention. Although salt springs yielding weak brines are scattered over Nova Scotia, mining of the first rock salt at Malagash was begun in 1918 and has proceeded to the present annual production of nearly 5,000 tons of high grade salt. In view of the fact that 75 per cent. of the salt imported by Canada for use by the fisheries is consumed on the Atlantic seaboard, there is ample room for the expansion of a maritime salt industry. The proximity of the salt beds to the eastern coal fields and to maritime ports should make possible in the near future a remunerative chemical industry. In connection with such possibility the presence of potash salts associated with certain bands in the Malagash deposit is of great interest. There is reason to believe that this latter deposit of salt underlies an extensive tract of country, and it is possible that potash salts of economic value may yet be discovered in association with it. The country from Malagash to Springhill offers great possibilities for the prospector in search of either coal or salt.

### Sweden's Chemical Industry

FIGURES for 1924 show that many of Sweden's principal imports have increased, including soya beans, etc., syrup and molasses, Glauber salts and sodium bi-sulphite, copper, nitrate of soda, mineral oils, oilcake, salt, raw phosphates, sulphur, and certain iron and steel and manufactures thereof. The following table gives the quantities of some of the chief imports and exports during 1924:

Imports.	Quantity. Kilogs.	Exports.	Quantity. Kilogs.
Vetches, soya beans, etc. ....	66,770,241	Wood pulp (sul- phate, sulphite, cardboard, etc.)	1,439,547,145
Mineral oils .....	253,216,325	Cement .....	66,669,505
Oilcake .....	103,589,503	Superphosphates ..	62,541,079
Salt .....	133,141,402	Bricks, fireproof ..	36,868,516
Raw phosphates ..	108,674,302	Felspar .....	14,072,030
Stassfurth salts ...	70,535,453		
Sulphur .....	65,156,574		
Iron and steel goods	206,164,841		
Glauber salts and sodium bi-sul- phite .....	62,031,239		
Nitrate of soda ...	34,906,228		
Linseed .....	30,768,206		

### Automatic Control in Manufacture

It has been stated that automatic control reduces costs, improves the product, and increases output, and the choice of regulating devices is therefore of importance to all engaged in manufacturing processes. In this connection the recent catalogue of British Arca Regulators, Ltd., Windsor House, Victoria Street, London, S.W.1, is of interest in that the firm's productions include automatic control apparatus for chemical plant, regulators for temperature, density, fluid level, humidity, and gas pressure and vacuum regulators. The principle in "Arca" apparatus is that slight changes act on an extremely sensitive relay device whereby hydraulic power of any desired force exerts a regulating influence on the valves or other mechanisms for maintaining the desired state. The relay device contains an "impulse receiver" which is connected with a pivoted lever so that it transmits any impulse due to changes in the state. One end of this lever impinges on a small jet of water, and its movement is arranged to suppress more or less the free flow of water from the jet, thus causing a difference of pressure in the pipe supplying the jet. This difference is used and multiplied on a diaphragm directly connected to a small pilot valve, which in turn controls the supply of water to the hydraulic cylinder operating the regulating valve or mechanism.

The action is instantaneous, due to the fact that the relay is practically free from friction, and that a non-compressible liquid, usually water, is the medium for transmission of force to the regulator. A self-cleaning filter is also included in the relay device.

## Chemical Matters in Parliament

### Boiler Cleaning Precautions

Sir W. Joynson-Hicks (House of Commons, July 29) in reply to Colonel Day, who drew attention to the accident at Shotton, Cheshire, when four men were killed owing to steam being turned into the boiler accidentally, said that such accidents were very rare. He would consider preventive measures, and thought that a provision in the new Factory Bill would meet the case.

### Oxalic Acid Import Duty

Sir F. Sanderson (House of Commons, July 29) asked the President of the Board of Trade whether, as there were to-day no British firms producing and selling oxalic acid, he could state the reason for the continued duty of 33½ per cent. on imports of this commodity from abroad.

Sir B. Chadwick said that oxalic acid was included in the lists issued under Section I (5) of the Safeguarding of Industries Act as a fine chemical and a synthetic organic chemical. There was no power to exempt from liability to duty any commodity falling under any of the general headings in the Schedule to the Act.

### Lead Poisoning in Pottery Industry

Mr. Clowes (House of Commons, July 30) asked the Secretary of State for the Home Department how many cases there were at the present time of persons receiving compensation for lead poisoning in the pottery trade, the length of time employed, and the ages of the persons; and whether any persons were receiving compensation who have only been employed in factories where low solubility or leadless glaze was used.

The Secretary of State for the Home Department (Sir William Joynson-Hicks) said that he regretted that that information was not available anywhere.

### Lead Poisoning Legislation

Mr. Couper (House of Commons, August 3) asked the Secretary of State for the Home Department whether he would consider the extension of the provisions of the Lead Paints (Protection against Poisoning) Bill so as to give protection against the dangers of poisoning incurred in painting, whether from lead or other paints.

Mr. Locker-Lampson said that he was advised that it was not necessary to do so, as there was no evidence of danger of poisoning from any paints other than those dealt with in the Bill.

### Chemical Warfare

Mr. Cecil Wilson (House of Commons, August 4) asked the Secretary of State whether the Committee of Imperial Defence had come to any decision as to the methods to be taken for the protection of the civil population against poison gas; and, if not, when such decision might be expected.

Sir L. Worthington-Evans said that consideration of this question was progressing, but he could not say when it would be completed.

Lieut.-Colonel Sir Joseph Nall asked whether it was not a fact that the Moscow Government were offering prizes for new inventions in poison gas.

### Merchandise Marks

Mr. Couper (House of Commons, August 4) asked the President of the Board of Trade whether he would consider an amendment of the Merchandise Marks Act to substitute the words foreign made for the name of the country of origin which was now required to be stamped on imported manufactured goods.

Sir P. Cunliffe-Lister said that he would consider this proposal in connection with any general measure which might be introduced for the amendment of the Merchandise Marks Act.

### Revenue from Silk Duties

Lieut.-Commander Kenworthy (House of Commons, August 4) asked the Financial Secretary to the Treasury how much money, approximately, had been collected to date in taxes and duties on silk and artificial silk; and how much of this was due, approximately, to be returned as rebate.

Mr. Guinness said that the figures of the month of July were not yet available. It was not possible to say how far the duty paid in a given period represented goods in respect of which drawback will become payable on export at some future time.

### Nitrogen Fixation in Washington

It was stated, in a paper by Messrs. H. K. Benson and W. L. Beuschlein before the American Chemical Society, that in the State of Washington 94 per cent. of the electric power is produced by water power, as contrasted with 34 per cent. in the United States as a whole. The municipally-owned plants of Tacoma and Seattle, together with highly developed privately owned systems, are all interconnected, thus providing a ready means for the disposal of surplus and seasonal current. This class of current is sold for as low as \$10 per kilowatt year. In general, the city ordinances permit the sale of continuous current to the chemical industries for \$30 per kilowatt year, with monthly discounts in favour of the buyer. By a combination of these two kinds of current it is evident that certain electro-chemical processes can be operated under favourable conditions.

The arc process of nitrogen fixation is one of these. Each furnace has a consumption of 600-1,000 kilowatts, and in a factory of 12 or 15 furnaces the operator can throw in or cut out at will in accordance with the amount of current furnished, each furnace reaching maximum efficiency with a few seconds of operation. The only arc plant in America has been in operation at La Grande, Washington, since 1916, and has recently enlarged its capacity to supply the American demand for sodium nitrite. The plant is operated by the American Nitrogen Products Co., of Seattle, Washington. The Wielgolaski furnace was developed from the original patent drawings, and now gives a satisfactory yield of about 60 grams of nitric acid per kilowatt hour. After partially cooling the gas, it enters absorption towers, and reacts with alkali to form nearly pure sodium nitrite in accordance with the reaction:  $\text{N}_2\text{O}_3 + 2\text{NaOH} \rightarrow 2\text{NaNO}_2 + \text{H}_2\text{O}$ . This solution is evaporated, crystallised, dried, and reaches the market in paper lined barrels. A second process in the nitrogen fixation group of industries is that of synthetic ammonia operated by the Pacific Nitrogen Corporation on the shores of Lake Union, Seattle. Electrical energy is used to decompose water for the production of hydrogen. This is mixed with the requisite amount of air, the mixture de-oxygenated, purified at low pressure, and finally ammonia is synthesised in the presence of a catalyst at a pressure of 300 atmospheres.

### British Gas Mantle Industry

Mr. J. R. YATES (chairman), speaking at the annual general meeting of the Welsbach Light Co., Ltd., in London, on Wednesday, said that the total turnover of the company in mantles and other goods showed an increase in money and a considerable increase in bulk over that of the preceding year. Owing to fierce foreign competition, sales of mantles had somewhat diminished in number and still more in money value. The diminution in sales occurred largely after August of last year, when Part II. of the Safeguarding Act of 1921 was deliberately allowed to lapse, up to which time the business in mantles was as large as, if not larger than, that of the same period in the preceding year. The directors awaited the report of the Safeguarding Committee and the action of the Government thereon. If an adequate duty were imposed on all mantle imports from all countries, the company would eventually be in a better position as regarded mantles than at any time since 1919, when foreign imports began to flow in, though allowance must be made for the disposal of the quantities already brought into this country.

### New Canadian Zinc Refinery

THE new zinc refinery of the Consolidated Mining and Smelting Co. of Canada, Ltd., which has been under construction for some months, is expected to commence operations in August. This will mean that the export of refined zinc from the other plant which is owned by the company will be materially increased, and, unless the demand for zinc grows rapidly, shipments of concentrates will be replaced in time by refined metal. Exports of lead and zinc last year were about two-thirds greater than in 1923. The United Kingdom and the East are expected to take the entire output of the new refinery.

## From Week to Week

MR. W. LIVESEY HELM, director of Lever Bros., Ltd., has joined the board of the British Oil and Cake Mills.

AFTER 30 YEARS' service with Lever Brothers, Ltd., Port Sunlight, Mr. John Houlden is emigrating to Australia.

SIR HERBERT MORGAN, director of Lever Brothers, Ltd., is resigning his seat on the board of A. and F. Pears, Ltd.

A CALCIUM CYANAMIDE PLANT is to be erected at Bobrek with a view to making German Upper Silesia independent of the Chorzow supplies. A carbide plant is also proposed.

MR. P. M. STEWART, chairman of the Associated Portland Cement Manufacturers, has returned from a tour of North America, where he has been investigating the uses of concrete in that country.

A REPORT on the vegetable oil industry in Brazil is now available (in Portuguese), and will be loaned to firms interested on application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. (Reference 11854/F.L.)

ALLEN-LIVERSIDGE, LTD., as from August 1, are taking over the sole selling agency for Great Britain and Ireland of the electric welding products of Buckley, Saunders and Co., Ltd., of Princes Street, Westminster, and Birmingham.

THE CORDITE FACTORY AT GRETNNA is still unsold, and a large consignment of alcohol obtained for the manufacture of cordite is also without a buyer. The factory cost £9,000,000, but the surrounding mounds, raised to minimise explosion risks, make the buildings unsuited to adaptation for other purposes.

EXCLUSIVE PATENT RIGHTS for the manufacture of artificial silk in America by the Bemberg process have been acquired by the New American Bemberg Corporation just incorporated in Delaware. American and German interests will be represented on the board and the corporation intends to erect plant immediately at two sites in Tennessee.

A REORGANISATION OF THE WORK of the helium division of the U.S.A. Bureau of Mines has been effected by the appointment of Mr. R. A. Cattell, formerly superintendent of the Petroleum Experiment Station, Bartlesville, as engineer in charge, and Dr. Andrew Stewart, chemist, as executive assistant. Dr. Stewart will be acting chief of the division during the absence of Mr. Cattell.

A DECISION IN FAVOUR OF CHEMICAL WARFARE was given at the annual meeting at Los Angeles of the Executive Committee of the American Chemical Society. The committee declared that "the prohibition of chemical warfare meant the abandonment of humane methods for the horrors of battle." They denounced the action of the Geneva Conference in banning the use of poison gas in war.

THE SUPERPHOSPHATE INDUSTRY has been carried on at a loss, during recent years, according to the directors' report submitted on behalf of J. and J. Cunningham, which firm is largely interested in the industry. A dividend of 10 per cent., less tax, is proposed for ordinary shares, and £4,485 is to be carried forward. For the previous year only 5 per cent., tax free, was paid, and £23,151 was carried forward.

A DINNER WAS HELD AT PRESTON by Joseph Foster and Sons, Preston and London, to mark the completion of the 70th year of Lieutenant-Colonel J. Y. Foster, senior partner. Over 500 guests, including the employees of the firm, were present. A presentation of a silver tea service and salver suitably inscribed was made to Colonel Foster on behalf of the staff. Tributes were paid to Colonel Foster's interest and consideration, and to the good feelings between the board and the staff.

IN THE KING'S BENCH DIVISION last week a motion was heard for judgment in default of defence in the action of James Marks Brown against Keeling's Oxides (1921), Ltd., manufacturers of zinc oxide at Landore and Felling-on-Tyne. Mr. Justice Roche made no order upon the motion, but ordered that a defence be delivered and that 5 per cent. of the sales in respect of which an account was undertaken should be paid into a bank in the joint names of the parties without any prejudice to any question in the action.

MR. JUSTICE ROCHE had before him in the King's Bench Division last week a motion by the Hillcrest Oil Co., of Manchester, the sellers, to set aside an award of the arbitrator of £2,000 damages in favour of the buyers, Dexters, Ltd., London, in respect of a contract dated August 13, 1923, under which the Hillcrest Co. sold to Dexters 250 tons of cotton seed grease at £9 per ton. It was alleged that the goods were not in accordance with the description. His Lordship found that the arbitrator had construed the contract right, and ordered the award to stand.

RECENT TENDERS ACCEPTED include W. Shepherd and Sons, Rochdale, asphaltic slag graded, £1 13s. per ton, for Faversham Council; Jeyes' Sanitary Compounds Co., Ltd., 64, Cannon Street, E.C., disinfectant, 2s. 3d. per gallon, for West Ham Council; W. Moss and Sons, Ltd., percolating filters, humus tanks and sewage plant, £130,514 4s. 8d. (recommended), for Loughborough Council; W. C. Holmes, Ltd., Whitestone Ironworks, Huddersfield, supply and erection of P. and A. tar extractor for dealing with one million c. ft. of gas per diem, for Tipton Council.

MR. N. M. BARNES, director of the Bleachers' Association, telf £199,020, with net personality £198,829.

MR. E. H. HOOKER, of the Hooker Electrochemical Co., has been elected president of the American Manufacturing Chemists' Association.

MR. W. PATERSON, of Stonehaven, was found dead in his garage on Sunday. Death was due to poisoning from the exhaust fumes of the running engine.

DR. E. D. BALL, Director of Scientific Work, United States Department of Agriculture, has resigned. He is well known for his research work on the combatting of insect pests.

A NEW LINSEED OIL FACTORY is to be started by the Leningrad Food Trust to synchronise with the new seed harvest. The plant is expected to produce 20,000 poods of oil per month.

MR. H. V. THOMPSON, principal of the Chemistry Department of the Central School of Science and Technology, Stoke, on Thursday, July 30, married Miss Alice G. Burton, of Stoke-on-Trent.

A SYNDICATE is proposed in the German aluminium industry. The aim of the syndicate would be to fix prices, and it is thought that home prices would be increased and export prices reduced.

A SERIOUS FIRE COMPLETELY DESTROYED the works of Snowden and Co., wholesale chemists, Lime Street, Newcastle, on the night of Thursday, July 30. Considerable stocks of chemicals were destroyed and continual explosions increased the damage.

### Obituary

DR. H. BUSCH, a prominent figure in the German potash industry.

MR. THOMAS BARR MC'CONNELL, of Rutherglen, formerly master dyer of the firm of W. Mc'Connell and Co., Ltd.

MR. JOHN HARTLEY, of Stoneyholme, aged 83, for 57 years in the employ of R. Parkinson, wholesale chemists, of Burnley.

MR. SYDNEY HILL, managing director of Blundell, Spence and Co., Ltd., paint and varnish manufacturers, Hull, from a heart attack while on holiday at Bridlington.

MR. DANIEL RANKIN STEUART, F.I.C., F.C.S., formerly chief chemist to the Broxburn Oil Co., aged 77. He was an authority on the chemistry of oil shales, and contributed an exhaustive treatise on the subject in connection with the Geological Survey, Scotland. He also rendered important service in connection with the controversy of some years ago relating to the flash-point of burning oils, and the failure of oils imported from abroad to conform to the British standard. Mr. Steuart was a native of Clydeside.

EMERITUS-PROFESSOR F. R. JAPP, formerly of the Chamber of Chemistry, Aberdeen University, in his 77th year. Professor Japp studied inorganic chemistry under Professor Bunsen at Heidelberg and organic chemistry under Professor Kekulé at Bonn. In 1881 he was appointed to the new Assistant Professorship of Chemistry at Normal School of Science, London, which post he retained until his appointment to Aberdeen. He resigned from the Chamber of Chemistry in 1914. Professor Japp was foreign secretary to the Chemical Society.

### Dyestuffs Licences for July

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during July, has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee:—The total number of applications received during the month was 565, of which 454 were from merchants or importers. To these should be added 49 cases outstanding on June 30, making a total for the month of 614. They were dealt with as follows:—Granted, 453 (of which 402 were dealt with within 7 days of receipt); referred to British makers of similar products, 110 (of which 77 were dealt with within 7 days of receipt); referred to Reparation Supplies available, 34 (all dealt with within 2 days of receipt); outstanding on July 31, 1925, 17. Of the total of 614 applications received 513, or 84 per cent., were dealt with within 7 days of receipt.

### China Clay Machinery Wanted

A BUSINESS firm in India wishes to be supplied with the names of British firms who can supply machinery for the refining of China Clay, the quantity to be dealt with representing an output of about 5,000 tons of refined clay per year. We shall be glad to supply particulars to any firm interested.

### Lactic Acid Wanted

AN AMERICAN correspondent is inquiring for the names of British manufacturers of lactic acid. Firms interested may obtain the name and address of the inquirer from THE CHEMICAL AGE.

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## Patent Literature

### Abstracts of Complete Specifications

**236,263.** PURIFICATION OF OILS AND OTHER LIQUIDS BY BAUXITE OR OTHER ADSORBENT. F. G. P. Remfry and A. E. Dunstan, Meadhurst, Cadbury Road, Sunbury-on-Thames. Application date, March 29, 1924.

In decolorising or desulphurising mineral oils by means of bauxite it has been found that the efficiency of the bauxite varies very greatly with its composition and physical condition, and simple tests have now been devised by which the efficiency of a sample of bauxite may be determined. It has been found that (1) The efficiency of bauxite as a filtering medium is a direct function of the percentage of moisture in the raw material; (2) when bauxite is dehydrated at 400° C. and allowed to cool, it will evolve heat when moistened with kerosene or other petroleum oil or water; the quantity of heat evolved is proportional to the percentage of water originally present in the raw material; (3) The efficiency in removing sulphur compounds from petroleum oils is directly proportional to the quantity of heat evolved when the bauxite is moistened with the oil to be treated; (4) The quantity of heat evolved and therefore the efficiency as an adsorbent varies with the degree of fineness of the bauxite.

In making the test, a quantity of roasted bauxite is just moistened with the oil, and the rise in the temperature noted. This method may also be employed to determine the degree of fineness to which the bauxite should be reduced for the greatest efficiency. It has been found that this occurs when the whole will pass through a screen of 30 meshes per linear inch, but none through a screen of 90 meshes per linear inch. It has further been found that the efficiency of bauxite as a colour remover is at a maximum when roasting has been at 400° C., and that the efficiency as a sulphur remover is at a maximum when the roasting has been effected at 600° C. The test must be employed immediately after roasting.

**236,281.** CELLULOSE-CONTAINING SOLUTIONS, MANUFACTURE OF. A. Classen, Aachen, Germany. Application date, April 2, 1924.

It is known that cellulose-containing solutions can be obtained by treating cellulose materials with hydrochloric acid above 39 per cent. concentration. A very large excess of hydrochloric acid is necessary, and the recovery of the acid is difficult. It has now been found that a cellulose solution in concentrated hydrochloric acid can be obtained reacting on the raw material, e.g., wood, in the presence of contact substances which are not attacked by hydrochloric acid. Metals such as platinum, tungsten, molybdenum are suitable, and copper is less efficient. Alloys such as ferro-tungsten, ferromolybdenum, ferro-vanadium, and silicides are also suitable. When these contact substances are employed, 0.5-2 parts of hydrochloric acid are sufficient for each part of wood. The action is assisted by the action of gaseous hydrochloric acid, and in this case commercial concentrated hydrochloric acid or more dilute acid can be used. The reaction is facilitated by the use of pressure up to five atmospheres. The cellulose solution may be employed for the production of artificial fibres, glucose, or alcohol.

**236,332.** INDIGOID DYESTUFFS AND INTERMEDIATE PRODUCTS, MANUFACTURE OF. O. Y. Imray, London. From Soc. of Chemical Industry in Basle, Switzerland. Application date, May 8, 1924.

Specification No. 214,864 (SEE THE CHEMICAL AGE, Vol. X, p. 578) describes the production of indigoid dyestuffs and intermediates by treating oxalyl chloride with  $\alpha$ -thionaphthol or a halogen substitution product of  $\alpha$ - or  $\beta$ -thionaphthol, and condensing the thionaphthisatin thus obtained with a compound containing a cyclic methylene group capable of reacting. The dyestuff may be further halogenated, or in the case of dyestuffs containing an amino group, acylated. Similar dyestuffs are now obtained by halogenating a thionaphthisatin, preferably in the presence of an indifferent diluent, and condensing the product with a compound containing a cyclic methylene group capable of reacting. These dyestuffs can be further halogenated, or if they contain an amino group, acylated. Examples are given of the preparation of a mono-bromo-2:1-thionaphthisatin, mono-bromo-1:2-thionaph-

thisatin, and brominated 2:3-thionaphthisatin, and the condensation of these with oxythionaphthene, acenaphthenone, and oxythionaphthene carboxylic acid.

**236,336.** CELLULOSE HYDRATES, APPLICATION OF. C. F. Cross, 2 and 4, New Court, Lincoln's Inn, London, W.C.2, and the Viscose Development Co., Ltd., Semreh Works, Pembroke Road, Bromley, Kent. Application date, May 12, 1924.

In the manufacture of various products from cellulose derivatives, these products pass from the highly hydrated state of the soluble derivatives through various processes of dehydration to their ultimate dry condition, when they contain about 10 per cent. of moisture. In some cases, e.g., in the case of caps for sealing bottles, it is important to preserve the hydrated form to prevent shrinkage before use. In this invention, glycerine is added to displace the water of hydration of cellulose gel, and combine with the cellulose, and this action is facilitated by the action of a deliquescent salt, particularly zinc chloride. The condition of hydration may thus be retained within wide limits. The articles are treated by immersion in a bath containing zinc chloride and glycerine, and on exposure to air a state of equilibrium is ultimately reached when the products are relatively dry. The additions can be removed by washing with water, and the hydrate then behaves as freshly prepared hydrate, so that it loses water on exposure. Calcium chloride or magnesium chloride may be used instead of zinc chloride. Any mineral acidity of the solution of zinc chloride may be corrected by neutralisation with a base, or by substituting an organic acid for the mineral acid.

**236,368.** LEAD OXIDES, PROCESS OF MANUFACTURING. G. Shimadzu, 420, Funaya Cho, Higashinotoin Oshikoji Sagaru, Kamikyo Ku, Kyoto, Japan. Application date, June 26, 1924.

Pieces of metallic lead are placed in a drum rotating at about 25 revolutions per minute, and air is blown through the drum. The temperature rises to about 60° C. due to friction and oxidation of the lead. The lead suboxide formed is continuously removed by abrasion, and a mixture of lead suboxide powder and metallic lead is finally obtained. This powder is capable of ignition by the initial application of heat or moisture, and combustion then continues yielding lead monoxide. The litharge thus obtained can be converted into red lead by heating to 500° C. The product is lighter and more porous than that obtained by the usual methods.

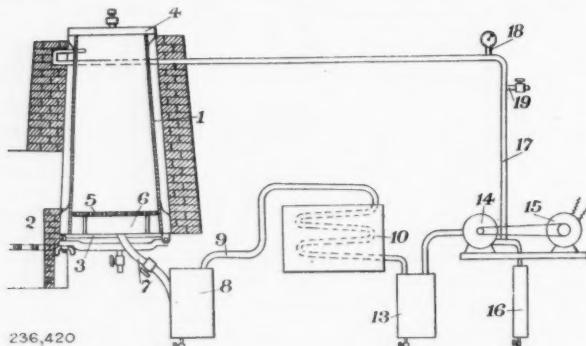
**236,379.** OLEFINE OXIDES, PROCESS OF MAKING. J. N. Burdick, Clendenin, Kanawha Co., W. Va., U.S.A. Application date, July 9, 1924.

The process is for making olefine oxides homologous with ethylene oxide, in which olefine chlorhydrins are decomposed by strong alkalies such as hydroxides of the alkali or alkaline earth metals. It has been found that a chlorhydrin solution of less than 40 per cent. concentration can be used if the olefine oxide is removed as formed, and with a chlorhydrin solution of 10 per cent. strength, a 90 per cent. yield of olefine oxide can be obtained. The solution is placed in a still provided with a rectifying column surmounted by a reflux condenser, and heated to boiling point. Caustic soda is added continuously, and ethylene oxide and steam pass into the rectifying column. The ethylene oxide passes through the condenser, and is condensed separately at a lower temperature. Propylene oxide may be obtained in a similar manner.

**236,420.** DISTILLING CARBONACEOUS MATERIAL SUCH AS OIL SHALE, PROCESS OF. H. Fairbrother, London. From Jackson Research Corporation, 37, West 44th Street, New York. Application date, September 23, 1924.

The oil shale is contained in a fixed vertical retort 1 which is heated by a furnace 2. The bottom 3 of the retort is hinged to allow the contents to be discharged. The material rests on a perforated false bottom 5, and the distillate escapes into a chamber 6 having outlets 7 leading to a tank 8 which receives the liquid. The vapour passes on through a pipe 9 to a surface condenser 10, in which the lighter oils and water vapour are condensed. The condensate passes into a separating tank 12, from which a pipe leads to a blower 14 driven by

a motor 15. The remaining gases are returned through a pipe 17 to the top of the retort to pass again through the shale. It is found that the passage of these gases through the retort causes the volatile oils to be volatilised at a much lower temperature than under normal conditions. The effect is comparable to that obtained by vacuum distillation. This



enables a much greater proportion of the distillate to be obtained as light oils. By this process, oil shale can be completely distilled at a temperature of 500°–600° C. instead of the usual 950° C. This enables steel retorts to be used instead of cast iron retorts.

**236,440. SPARINGLY SOLUBLE LEAD COMPOUNDS, PROCESS FOR PRODUCING FROM LEAD SULPHATE.** S. G. S. Dicker, London. From Consortium für Nassmetallurgie, in Oker, Harz, Germany. Application date, November 14, 1924.

In this process sparingly soluble lead compounds such as lead chromate, are obtained from ores, metallurgical products, by-products of chemical processes, such as lead chamber sludge, etc. The raw material is extracted by means of chlorides of alkali or alkaline earth metals, which preferably contain a slight excess of hydrochloric acid. The material may be oxidised with air, chlorine, bromine, chlorates, or nitrates, to precipitate any iron that may be present. The liquid is filtered and reduced with granulated or spongy lead to precipitate any silver present. Lead salts of acids of chromium, tungsten, molybdenum, uranium, arsenic, or antimony, can be precipitated from the solutions of lead compounds—e.g., the sulphate, in concentrated solutions of alkali chlorides. In an example, lead slimes are dissolved in saturated sodium chloride containing hydrochloric acid, the mixture being heated to 80° C. Saltpetre is added to oxidise the iron, and the mixture neutralised with calcium carbonate and filtered. The filtrate is treated at 85° C., with a solution of potassium bichromate and sodium carbonate to precipitate orange chrome. Other examples are given of the production of lead arsenite, lead antimonate, and lead molybdate.

**236,494. FERTILISERS, MANUFACTURE OF.** J. Y. Johnson, London. From Badische Anilin und Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, March 14, 1925.

The object is to obtain a compound fertiliser containing potash, nitrogen, and phosphoric acid. A very stable water-soluble mixture is obtained by mixing potassium nitrate, urea, and ammonium phosphate. The nitrogen is thus contained in three forms, as nitrate, ammonia, and amide. The potash may be employed in the form of sulphate instead of nitrate. An example consists of potassium nitrate 215 parts, diammonium phosphate 190 parts, and urea 70 parts, and this mixture contains over 60 per cent. of the chief fertilising ingredients.

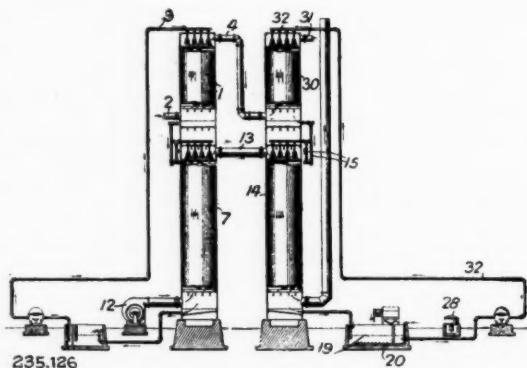
**NOTE.—**Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 221,513 (Synthetic Ammonia and Nitrates, Ltd.) relating to production of nitric acid from ammonia, see Vol. XI, p. 504; 223,911 (Soc. of Chemical Industry in Basle) relating to manufacture of condensation products of the anthraquinone series, see Vol. XII, p. 13; 225,174 (Soc. Chimique des Usines du Rhône) relating to process for the reduction of halogenated hydrocarbons, see Vol. XII, p. 87.

#### International Specifications not yet Accepted

**235,125, 235,126, and 235,127. PURIFYING GASES.** Koppers Co., 800, Union Trust Building, Pittsburg, U.S.A. (Assignees of G. E. Seil, 92, Parker Street, Newark, N.J., U.S.A., and F. W. Sperr, 800, Union Trust Building, Pittsburg, U.S.A.). International Convention date, June 6, 1924.

**235,125.** Impurities such as hydrogen sulphide are removed from coal gas by transferring them from the gas to a current of air which is then washed with a liquid containing iron oxide. The gas is washed in a scrubber 1, with sodium carbonate solution, and the solution is then regenerated in a chamber 7 by means of an air current from a fan 12. The air then passes through a scrubber 14 in the same direction as a liquid containing an iron compound, and the liquid containing sulphur passes to a tank 19, where it is agitated by air jets 20. The sulphur floats and is removed and dried in a centrifuge 28.

**235,126.** In the process described in 235,125, the last trace of impurity in the gas is removed by a second washing with freshly regenerated liquid. About 90 per cent. of the sulphuretted hydrogen is absorbed in the scrubber 1, and the sodium carbonate is regenerated by air in the chamber 7, and returned to the scrubber 1. The air passes through pipe 13 to a scrubber 14, where it is treated with dilute sodium carbonate containing freshly precipitated ferric carbonate.



The liquid is regenerated in a tank 19 and passed through a pipe 32 to the top of scrubber 30, in which the remainder of the sulphuretted hydrogen is extracted. The washing liquid then passes into the scrubber 14.

**235,127.** In this apparatus, the four scrubbers, 1, 7, 30, 14, are combined in a single tower, and the air from which the impurities have been removed is circulated back to the stream of air to which the impurities from the gases are transferred.

**235,169. DYES.** Chemische Fabrik Griesheim-Elektron, Frankfurt-on-Main, Germany. International Convention date, June 7, 1924.

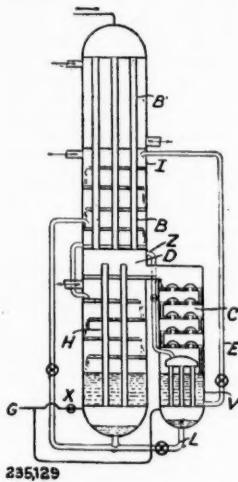
Azo dyes, which are particularly suitable for dyeing rubber, and which are not affected by the vulcanisation, are obtained by coupling 2 : 3-oxynaphthoic β-naphthalide with an unsulphonated diazo compound containing substituents in the 2- and 5-positions, one of which must be halogen. Diazo compounds include 4-chlor-1 : 2- or 1 : 3-toluidine, 4-chlor-1 : 2- or 1 : 3-anisidine, 4-chlor-1 : 2- or 1 : 3-phenetidine, 2 : 5-dichloraniline, 4-chlor-2-aminodiphenyl ether, 4-chlor-2-amino-phenylbenzylether. The dyes may be produced either in substance or on the fibre.

**235,181. HYDROCYANIC ACID.** Norsk Hydro-Elektrisk Kvaælstofaktieselskab, 7, Solligaten, Oslo, Norway. International Convention date, June 3, 1924.

A mixture of nitrogen, hydrogen, and a hydrocarbon is treated in an electric arc furnace of the blown arc type, preferably of the Birkeland-Eyde kind. The gases after leaving the arc must not have a temperature above 600° C. and must not come into contact with furnace walls above 400° C. The metal walls are therefore strongly cooled, the heat absorbed being used to generate steam.

- 235,129. SEPARATING GASEOUS MIXTURES BY LIQUEFACTION. L'Air Liquide Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude, 48, Rue St. Lazare, Paris. International Convention date, June 3, 1924.

The apparatus is for separating hydrogen from coke oven or coal gas. The liquefied gas containing nitrogen is progressively rectified in an auxiliary column under the pressure of liquefaction, and the gas rich in nitrogen is returned to the liquefier. The final liquefaction takes place in an upper nest of tubes B, and the auxiliary column C communicates with the collector



D. The cooled compressed gas is supplied through a pipe G to the lower nest of tubes H and to the vaporiser V. The liquid from the vaporiser passes through pipe E to the space I surrounding the tubes B. The liquefied gas from the tubes in the vaporiser V, passes through a pipe L to the main column, while the unliquefied gas passes through a pipe Z to the collector D.

#### LATEST NOTIFICATIONS.

- 237,551. Method of and apparatus for refrigeration. Silica Gel Corporation. July 22, 1924.
- 237,567. Process for the preliminary treatment of cellulose prior to esterification. Soc. Chimiques des Usines du Rhone. July 28, 1924.
- 237,574. Method of making acetyl salicylic acid. Ketoid Co. July 22, 1924.
- 237,575. Method of manufacturing acetic anhydride. Ketoid Co. July 22, 1924.
- 237,590. Manufacture of compounds of dialkyl or aryl alkyl barbituric acids. Hoffmann la Roche and Co. Akt.-Ges., F. July 23, 1924.
- 237,591. Method of manufacturing cellulose acetate. Ketoid Co. July 22, 1924.
- 237,594. Manufacture of ortho-oxyazo-dyestuffs. Akt.-Ges. für Anilin-Fabrikation. July 28, 1924.
- 237,615. Process of producing complex salts of hydrofluoric acids. A. F. Meyerhofer. December 20, 1923.
- 237,616. Process of producing complex salts of hydrofluoric acids. A. F. Meyerhofer. December 20, 1923.
- 237,626. Process for preparation of base-exchanging substance for removing iron, manganese, calcium, and magnesium from water. Nordiske Natrolith Aktieselskap. July 25, 1924.

#### Specifications Accepted with Date of Application

- 214,652. Chemical reactions, Process and apparatus for carrying out. E. Slatineanu. April 19, 1923.
- 218,247. Rubber and the like, Process for treating, and products obtained thereby. Naugatuck Chemical Co. June 25, 1923.
- 216,140. Light oils and gaseous constituents from distillation products, Process for obtaining. Gelsenkirchener Bergwerks Akt.-Ges., and H. Hock. May 16, 1923.
- 227,090. Arsenates of the alkaline earth metals, Process for the manufacture of. Soc. Chimique des Usines du Rhône. January 3, 1924. Addition to 216,098.
- 228,143. Light alloys. Soc. Anon. Nieuport-Astra. January 23, 1924.
- 230,045. Separating compounds of potassium from compounds of aluminium, Process for. Norsk Hydro-Elektrisk Kvaefstofaktieselskab. February 27, 1924.

- 232,185. Synthetic ammonia, Process for the preparation of a mixture of nitrogen and hydrogen for the manufacture of. Compagnie de Produits Chimiques et Electrometallurgiques Alais, Forges et Camargue. April 24, 1924.
- 233,318. Cellulose, Manufacture of, by boiling wood, or similar material, with bisulphite solutions. A. Peetz. April 30, 1924.
- 236,984. Decolorising carbon, Apparatus for making and using. J. N. A. Sauer. April 5, 1924.
- 237,030. Oxides of carbon into oxygenated organic compounds, Process for transforming. J. Y. Johnson. April 28, 1924. (Badische Anilin und Soda Fabrik.)
- 237,054. Mordanting and dyeing of wool. C. S. Bedford. May 22, 1924.
- 237,096. Dyestuffs of the triarylmethane series, Manufacture of. A. G. Ransford and A. Carpmael. (Farbenfabriken vorm. F. Bayer and Co.). July 18, 1924.
- 237,100. 1-nitro-2-methyl-anthraquinone, Manufacture of purified. H. E. Fierz. July 28, 1924.

#### Applications for Patents

- Asphalt Cold Mix, Ltd., and Levy, F. Bituminous emulsions. 19,277. July 29.
- Atlas Powder Co. Varnishes, enamels, etc. 19,571. August 1. (United States, April 18.)
- Badische Anilin-und Soda-Fabrik, and Johnson, J. Y. Production of fast dyes on wool. 19,043. July 27.
- Bashiloff, I. Method of separating radium and barium salts. 19,497. July 31.
- Binz, A., and Deutsche Gold-und Silber Scheideanstalt vorm. Roessler, and Räth, C. Production of heterocyclic arsenic-containing compounds. 19,472. July 31.
- British Celanese, Ltd., and Ellis, G. H. Dyeing cellulose acetate articles. 19,324. July 30. (April 4, 1924.)
- British Dyestuffs Corporation, Ltd., and Mendoza, M., and Saunders, K. H. Manufacture of dyestuffs, etc. 19,478. July 31.
- Casale, L. Preparation of methanol, etc. 19,092. July 27.
- Chemisch Pharmazeutische Akt.-Ges. Bad-Homburg. Manufacture of adsorption products. 19,259. July 29. (Germany, July 29, 1924.)
- Courtaulds, Ltd., and Whittaker, C. M. Manufacture of artificial silk. 19,044. July 27.
- Humphreys and Glasgow, Ltd. Purifying gases. 19,468. July 31. (United States, August 1, 1924.)
- Illingworth Carbonisation Co., Ltd., and Illingworth, S. R. Apparatus for manufacture of carbonised fuel. 19,384. July 30.
- Kelly, T. H. Surfacing of rubber, etc. 19,255. July 29.
- Perrett, I. G. Treatment and purification of waste waters of trade effluents, etc. 19,046. July 27.
- Pickard, J. A. Oil-filters. 19,339. July 30.
- Pope, Sir W. J. Manufacture of pharmaceutical products. 19,163. July 28.
- Portas, H. W. Lime hydrator. 19,134. July 28.
- Regal, A. Manufacture of artificial resins. 19,195. July 29.
- Sejvl, J. Means for detecting, etc., hydrocarbon gases. 19,026. July 27. (Czecho-Slovakia, August 15, 1924.)
- Shaw, H. S. Trap-nests. 19,549. August 1.
- Shaw, H. S. Hele-. Separation of liquids. 19,050. July 27.
- Simon, A., Simon Bros. (Engineers), Ltd., and Simon, L. J. Extraction of oils, etc. 19,460. July 31.
- Soc. of Chemical Industry in Basle. Dyestuffs. 19,269. July 29. (Switzerland, August 9, 1924.)
- Steffen, C. Process for obtaining tricalcium saccharate. 19,578. August 1. (Austria, May 18.)
- Wrigley, H. Manufacture of potash alum and sulphate of alumina. 19,123. July 28.

#### Tariff Changes

GILBERT AND ELICE ISLANDS.—Soap (ex toilet soap) and sugar are now duty free.

BOLIVIA.—The following import duties are now imposed: sulphur and iron pyrites 30 cts. per 100 kilogs.; impure industrial sulphuric acid, 5 cts. per kilog. gross.

GUATEMALA.—Import duty on paraffin wax has been reduced to 5 cts. per kilog. (gross weight). Duty on mineral waxes remains at 10 cts. per kilog.

NORWAY.—Alterations now give the following rates of import duty (in kroner):—Fuel, artificial, chemically produced, not mentioned elsewhere, 0·15; mineral waters of all kinds, 0·10 per litre; silk waste, free; tar of wood, peat or coal; also bright and black varnish; tar oil, including creosote oil, coal oil, crude carbolic acid and similar products proceeding from the distillation of tar; products extracted from coal tar for manufacturing paints, also tetracarnite, free.

PERU.—A decree establishes a monopoly of the manufacture and exploitation of matches and similar articles.

UNITED STATES.—The duty on heliotropine is to be raised from 80 cents per lb. to \$1.75.

## Weekly Prices of British Chemical Products

*The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.*

### General Heavy Chemicals

Acid Acetic, 40% Tech.—£20 per ton.  
 Acid Boric, Commercial.—Crystal, £40 per ton, Powder, £42 per ton.  
 Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.  
 Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.  
 Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations : 140° Tw., Crude Acid, 60s. per ton, 168° Tw., Arsenical, £5 10s. per ton, 168° Tw., Non-arsenical, £6 15s. per ton.  
 Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.  
 Bleaching Powder.—Spot, £10 10s. d/d; Contract, £9 10s. d/d. 4 ton lots.  
 Bisulphite of Lime.—£7 10s. per ton, packages extra, returnable.  
 Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)  
 Calcium Chlorate (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.  
 Copper Sulphate.—£25 to £25 10s. per ton.  
 Methylated Spirit 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.  
 Nickel Sulphate.—£38 per ton d/d.  
 Nickel Ammonia Sulphate.—£38 per ton d/d.  
 Potash Caustic.—£30 to £33 per ton.  
 Potassium Bichromate.—5d. per lb.  
 Potassium Chlorate.—3d. per lb., ex wharf, London, in cwt. kegs. Sal ammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.  
 Salt Cake.—£3 15s. to £4 per ton d/d. In bulk.  
 Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength; 20s. less for contracts.  
 Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.  
 Sodium Acetate 97/98%.—£21 per ton.  
 Sodium Bicarbonate.—£10 10s. per ton, carr. paid.  
 Sodium Bichromate.—4d. per lb.  
 Sodium Bisulphite Powder 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.  
 Sodium Chlorate.—3d. per lb.  
 Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liver pool.  
 Sodium Nitrite 100% basis.—£27 per ton d/d.  
 Sodium Phosphate, £14 per ton, f.o.r. London, casks free.  
 Sodium Sulphate (Glauber Salts).—£3 12s. 6d. per ton.  
 Sodium Sulphide conc. solid. 60/65.—£13 5s. per ton d/d. Contract £13. Carr. pd.  
 Sodium Sulphide Crystals.—Spot, £8 12s. 6d. per ton d/d. Contract £8 10s. Carr. pd.  
 Sodium Sulphite, Pea Crystals.—£14 per ton f.o.r. London, 1-cwt. kegs included.

### Coal Tar Products

Acid Carbolic Crystals.—4½d. to 4½d. per lb. Slightly better demand. Crude 60's, no market owing to weakness of crystals.  
 Acid Cresylic 97/99.—1s. 6d. to 1s. 9d. per gall. Little demand. Pale, 95%, 1s. 5d. to 1s. 6d. per gall. Dark, 1s. 2d. to 1s. 3d. per gall.  
 Anthracene Paste 40%.—3d. per unit per cwt.—Nominal price. No business.  
 Anthracene Oil, Strained.—7½d. to 8d. per gall. Unstrained, 6d. to 7d. per gall.  
 Benzol.—Crude 65's.—11d. to 1s. 3d. per gall., ex works in tank wagons. Standard Motor, 1s. 8d. to 1s. 10d. per gall., ex works in tank wagons. Pure, 1s. 9½d. to 2s. per gall., ex works in tank wagons.  
 Toluol.—90%, 1s. 8½d. to 1s. 9d. per gall. More inquiry. Pure, 1s. 9½d. to 2s. per gall.  
 Xylo Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.  
 Creosote.—Cresylic, 20/24%, 8d. per gall. Standard specification, middle oil, heavy, 5½d. to 6½d. per gall. Fair business.  
 Naphtha.—Solvent 90/160, 1s. 5d. to 1s. 9d. per gall. Demand good. Solvent 90/190, 1s. to 1s. 4d. per gall. Fair demand.  
 Naphthalene Crude.—Drained Creosote Salts, £3 to £5 per ton. Market quiet. Whizzed or hot pressed. No demand.  
 Naphthalene.—Crystals and Flaked, £10 to £13 per ton, according to districts. Very quiet.  
 Pitch.—Medium soft, 40s. to 42s. 6d. per ton, according to district. Slightly more inquiry.  
 Pyridine.—90/160, 1s. 6d. to 2s. per gall. Heavy, 11s. 6d. to 12s. per gall. Fair business.

### Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.  
 Acid Anthranilic 7s. per lb. 100%.  
 Acid Benzoinic 1s. 9d. per lb.  
 Acid H.—3s. 6d. per lb. 100% basis d/d.  
 Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.  
 Acid Nevile and Winther.—4s. 10d. per lb. 100% basis d/d.  
 Acid Salicylic, technical.—11d. to 11½d. per lb. Steady demand.  
 Acid Sulphanilic.—9d. per lb. 100% basis d/d.  
 Aluminium Chloride, anhydrous.—10d. per lb. d/d.  
 Aniline Oil.—7d. to 7½d. per lb. naked at works.  
 Aniline Salts.—7d. to 8d. per lb. naked at works.  
 Antimony Pentachloride.—1s. per lb. d/d.  
 Benzidine Base.—3s. 6d. per lb. 100% basis d/d.  
 Benzyl Chloride 95%.—1s. 1d. per lb.  
 p-Chlorophenol.—4s. 3d. per lb. d/d.  
 p-Chloraniline.—3s. per lb. 100% basis.  
 o-Cresol 29/31° C.—3d. per lb. Demand quiet.  
 m-Cresol 68/100%.—2s. 10d. per lb. Demand moderate.  
 p-Cresol 32/34° C.—2s. 1d. per lb. Demand moderate.  
 Dichloraniline.—2s. 3d. per lb.  
 Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.  
 Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.  
 Dimethylaniline.—2s. 1½d. per lb. d/d. Drums extra.  
 Dinitrobenzene.—9d. per lb. naked at works.  
 Dinitrochlorobenzene.—£84 10s. per ton d/d.  
 Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works.  
 66/68° C. 1s. per lb. naked at works.  
 Diphenylaniline.—2s. 10d. per lb. d/d.  
 G. Salt.—2s. 2d. per lb. 100% basis d/d.  
 a-Naphthol.—1s. 10d. per lb. d/d.  
 B-Naphthol.—1s. per lb. d/d.  
 a-Naphthylamine.—1s. 3d. per lb. d/d.  
 B-Naphthylamine.—3s. 9d. per lb. d/d.  
 m-Nitraniline.—3s. 9d. per lb. d/d.  
 p-Nitraniline.—1s. 11d. per lb. d/d.  
 Nitrobenzene.—5d. to 5½d. per lb. naked at works.  
 o-Nitrochlorobenzol.—2s. 3d. per lb. 100% basis d/d.  
 Nitronaphthalene.—10d. per lb. d/d.  
 p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.  
 p-Nitro-o-amido-phenol.—4s. 6d. per lb. 100% basis.  
 m-Phenylene Diamine.—4s. per lb. d/d.  
 p-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.  
 R. Salt.—2s. 4d. per lb. 100% basis d/d.  
 Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.  
 o-Tolidine.—10d. per lb.  
 p-Tolidine.—2s. 3d. per lb. naked at works.  
 m-Tolylene Diamine.—4s. per lb. d/d.

### Wood Distillation Products

Acetate of Lime.—Brown £9 10s. to £10. Quiet market. Grey £15 per ton. Liquor, 9d. per gall. 32° Tw.  
 Acetone.—£73 per ton.  
 Charcoal.—£7 5s. to £8 10s. per ton, according to grade and locality.  
 Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s..2d. per gall. 24° Tw.  
 Red Liquor.—10d. to 1s. per gall. 14/15° Tw.  
 Wood Creosote.—2s. 9d. per gall. Unrefined.  
 Wood Naphtha, Miscible.—4s. 3d. per gall.  
 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P.  
 Wood Tar.—4s. per ton.  
 Brown Sugar of Lead.—£43 per ton.

### Rubber Chemicals

Antimony Sulphide.—Golden, 7½d. to 1s. 5d. per lb., according to quality. Crimson, 1s. 5d. to 1s. 7½d. per lb., according to quality.  
 Arsenic Sulphide, Yellow.—2s. per lb.  
 Barytes.—£3 10s. to £6 15s. per ton, according to quality.  
 Cadmium Sulphide.—4s. 4d. per lb.  
 Carbon Bisulphide.—£25 to £28 per ton, according to quantity.  
 Carbon Black.—5½d. per lb., ex wharf.  
 Carbon Tetrachloride.—£55 to £60 per ton, according to quantity, drums extra.  
 Chromium Oxide, Green.—1s. 3d. per lb.  
 Diphenylguanidine, 4s. to 4s. 3d. per lb.  
 Indiarubber Substitutes, White and Dark.—5½d. to 6½d. per lb.  
 Lamp Black.—£43 per ton, barrels free.  
 Lead Hyposulphite.—9d. per lb.  
 Lithopone, 30%.—£22 10s. per ton.  
 Mineral Rubber "Rubpron."—£13 12s. 6d. per ton f.o.r. London.  
 Sulphur.—£9 to £11 per ton, according to quality.

Sulphur Chloride.—4d. per lb., carboys extra.  
 Sulphur Precip. B.P.—£50 to £55 per ton.  
 Thiocarbamide.—2s. 6d. to 2s. 9d. per lb.  
 Thiocarbanilide.—2s. 1d. to 2s. 3d. per lb.  
 Vermilion, Pale or Deep.—5s. per lb.  
 Zinc Sulphide.—1s. 1d. per lb.

#### Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£40 per ton ex wharf London in glass containers.  
 Acid, Acetyl Salicylic.—2s. 8d. to 2s. 10d. per lb. British makers meeting foreign competition in quality and price.  
 Acid, Benzoic B.P.—2s. to 2s. 3d. per lb., according to quantity.  
 Acid, Boric B.P.—Crystal £46 per ton, Powder £50 per ton. Carriage paid any station in Great Britain.  
 Acid, Camphoric.—19s. to 21s. per lb.  
 Acid, Citric.—1s. 3d. to 1s. 4½d. per lb., less 2½%.  
 Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots.  
 Acid, Pyrogallic, Crystals.—5s. 4d. to 5s. 6d. per lb.  
 Acid, Salicylic.—1s. 2d. per lb., in ton lots. Good demand.  
 Technical.—10½d. to 11d. per lb.  
 Acid, Tannic B.P.—2s. 8d. per lb.  
 Acid, Tartaric.—1½d. per lb., less 5%.  
 Amidol.—9s. per lb., d/d.  
 Acetanilide.—1s. 5d. per lb. for quantities.  
 Amidopyrin.—1s. 3d. per lb.  
 Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb., according to quantity.

Ammonium Carbonate B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.  
 Atropine Sulphate.—11s. 6d. per oz. for English make.

Barbitone.—11s. per lb.  
 Benzonaphthol.—3s. 6d. per lb. spot.  
 Bismuth Carbonate.—1s. 2d. to 1s. 4d. per lb. Prices advanced.  
 Bismuth Citrate.—1s. 4d. to 1s. 4d. per lb. Supplies of the metal are still restricted.  
 Bismuth Salicylate.—1s. 2d. to 1s. 2d. per lb.  
 Bismuth Subnitrate.—1s. 9d. to 1s. 9d. per lb. according to quantity.

Borax B.P.—Crystal £29. Powder £30 per ton. Carriage paid any station in Great Britain.

Bromides.—Potassium, 2s. 1d. to 2s. 3d. per lb.; sodium, 2s. 2d. to 2s. 4d. per lb.; ammonium, 2s. 6d. to 2s. 8d. per lb., all spot. British or Imported. Prices unchanged. Firm.

Calcium Lactate.—1s. 6d. to 1s. 8d., according to quantity.  
 Chloral Hydrate.—3s. 5d. to 3s. 6d. per lb., duty paid.

Chloroform.—2s. 3d. to 2s. 7½d. per lb., according to quantity.

Creosote Carbonate.—6s. 9d. per lb.  
 Formaldehyde.—£38 per ton, in barrels ex wharf.

Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 60%, 2s. 6d. per lb.

Guaiacol Carbonate.—6s. 3d. to 6s. 6d. per lb.

Hexamine.—2s. 4d. powder crystal, 2s. 6d. free running crystal, per lb.

Homatropine Hydrobromide.—30s. per oz.

Hydrastine Hydrochloride.—English make offered at 120s. per oz.

Hydrogen Peroxide (12 vols).—1s. 8d. per gallon f.o.r. makers' works, naked.

Hydroquinone.—4s. 1½d. per lb.

Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.

Iron Ammonium Citrate B.P.—1s. 8d. to 1s. 11d. per lb. Green, 2s. 2d. to 2s. 7d. per lb. U.S.P., 1s. 7d. to 1s. 10d. per lb.

Magnesium Carbonate.—Light Commercial, £34 per ton net. Light pure, £46 per ton.

Magnesium Oxide.—Light Commercial, £65 per ton, less 2½%, price reduced; Heavy Commercial, reduced to £24 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.

Menthol.—A.B.R. recrystallised B.P., 46s. 9d. per lb.; prompt delivery. Synthetic, 22s. 6d. to 31s. 6d. per lb., according to quality. English make.

Mercurials.—Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb. Very quiet.

Methyl Salicylate.—1s. 4½d. to 1s. 8d. per lb.

Methyl Sulphonial.—17s. 9d. per lb.

Metol.—11s. per lb. British make.

Paraformaldehyde.—2s. for B.P. quality.

Paraldehyde.—1s. 4d. per lb., in free bottles and cases.

Phenacetin.—4s. 2d. to 4s. 3d. per lb. in cwt. lots.

Phenazone.—6s. 2d. per lb.

Phenolphthalein.—4s. 1d. per lb.

Potassium Bitartrate 99/100% (Cream of Tartar).—72s. per cwt., less 2½% for ton lots.

Potassium Citrate.—1s. 7d. to 1s. 10d. per lb.

Potassium Ferricyanide.—1s. 9d. per lb. Quiet.

Potassium Iodide.—16s. 8d. to 16s. 10d. per lb., according to quantity. Steady market.

Potassium Metabisulphite.—6d. to 7½d. per lb., 1-cwt. kegs included, f.o.r. London.  
 Potassium Permanganate.—B.P. crystals, 7½d. per lb., spot.  
 Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.  
 Resorcin.—3s. 9d. per lb. In fair quantities.  
 Saccharin.—63s. per lb. in 50 lb. lots.  
 Salol.—3s. 3d. to 3s. 6d. per lb.  
 Silver Proteinate.—12s. per lb. for satisfactory product light in colour.  
 Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb.  
 Sodium Citrate, B.P.C., 1911.—1s. 4d. to 1s. 7d. per lb., B.P.C., 1923, 1s. 7d. to 1s. 8d. per lb., according to quantity. U.S.P., 1s. 7d. to 1s. 10d. per lb.  
 Sodium Hyposulphite, Photographic.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.  
 Sodium Metabisulphite Crystals.—37s. 6d. to 6os. per cwt., net cash, according to quantity.  
 Sodium Nitroprusside.—16s. per lb.  
 Sodium Potassium Tartrate (Rochelle Salt).—75s. per cwt., for ton lots and upwards.  
 Sodium Salicylate.—Powder, 1s. 10d. to 2s. 2d. per lb. Crystal, 2s. to 2s. 2d. per lb. Flake, 2s. 3d. to 2s. 4d. per lb.  
 Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.  
 Sodium Sulphite, anhydrous, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.  
 Sulphonial.—12s. 8d. per lb.  
 Thymol.—15s. per lb.

#### Perfumery Chemicals

Acetophenone.—9s. per lb.  
 Aubepine (ex Anethol).—10s. per lb.  
 Amyl Acetate.—3s. per lb.  
 Amyl Butyrate.—6s. 6d. per lb.  
 Amyl Salicylate.—3s. 1½d. per lb.  
 Anethol (M.P. 21/22° C.).—5s. per lb.  
 Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 6d. per lb.  
 Benzyl Alcohol free from Chlorine.—2s. 6d. per lb.  
 Benzaldehyde free from Chlorine.—3s. per lb.  
 Benzyl Benzoate.—2s. 9d. per lb.  
 Cinnamyl Aldehyde Natural.—15s. 6d. per lb.  
 Coumarin.—14s. per lb.  
 Citronellol.—10s. per lb.  
 Citral.—8s. 6d. per lb.  
 Ethyl Cinnamate.—9s. per lb.  
 Ethyl Phthalate.—3s. per lb.  
 Eugenol.—9s. 6d. per lb.  
 Geraniol (Palmarosa).—27s. per lb.  
 Geraniol.—8s. to 16s. per lb.  
 Heliotropine.—6s. 3d. per lb.  
 Iso Eugenol.—14s. 6d. per lb.  
 Linalol ex Bois de Rose.—20s. per lb.  
 Linalyl Acetate.—18s. 6d. per lb.  
 Methyl Anthranilate.—9s. 3d. per lb.  
 Methyl Benzoate.—5s. per lb.  
 Musk Ambrette.—5os. per lb.  
 Musk Ketone.—37s. 6d. per lb.  
 Musk Xylo.—9s. 6d. per lb.  
 Nerolin.—4s. per lb.  
 Phenyl Ethyl Acetate.—15s. per lb.  
 Phenyl Ethyl Alcohol.—13s. per lb.  
 Rhodinol.—37s. 6d. per lb.  
 Safrol.—1s. 8d. per lb.  
 Terpineol.—1s. 10d. per lb.  
 Vanillin.—21s. 6d. to 23s. 6d. per lb.

#### Essential Oils

Almond Oil, Foreign S.P.A.—13s. 3d. per lb.  
 Anise Oil.—3s. 6d. per lb.  
 Bergamot Oil.—17s. 6d. per lb.  
 Bourbon Geranium Oil.—17s. 6d. per lb.  
 Camphor Oil.—6os. per cwt.  
 Cananga Oil, Java.—11s. 3d. per lb.  
 Cinnamon Oil, Leaf.—5d. per oz.  
 Cassia Oil, 80/85%.—9s. 3d. per lb.  
 Citronella Oil.—Java, 85/90%, 4s. 6d. per lb. Ceylon, 2s. 8d. to 2s. 10d. per lb., according to quality.  
 Clove Oil.—6s. 9d. per lb.  
 Eucalyptus Oil, 70/75%.—1s. 9d. per lb.  
 Lavender Oil.—French 38/40% Esters, 28s. 6d. per lb.  
 Lemon Oil.—5s. 3d. per lb. Receding.  
 Lemongrass Oil.—5s. per lb.  
 Orange Oil, Sweet.—10s. 9d. per lb.  
 Otto of Rose Oil.—Bulgarian, 6os. per oz. Anatolian, 35s. per oz.  
 Palma Rosa Oil.—13s. 9d. per lb.  
 Palma Rose Oil.—15s. 3d. per lb.  
 Peppermint Oil.—Wayne County. No good quality material available. Japanese, 18s. per lb.  
 Petitgrain Oil.—9s. per lb.  
 Sandal Wood Oil.—Mysore, 26s. per lb. Australian, 18s. 6d. per lb.

## Scottish Chemical Market

*The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, August 7, 1925.

A quiet tone prevails in the Heavy Chemical Market, orders placed being in most cases of small volume. Some slight changes in prices are advised, but none of much importance.

### Industrial Chemicals

**ACID ACETIC.**—In moderate request and price unchanged. 98/100% glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports; 80% pure, £40 to £42 per ton; 80% technical, £39 to £41 per ton packed in casks, c.i.f. U.K. ports.

**ACID BORIC.**—Crystal, granulated, or small flaked, £40 per ton; powdered, £42 per ton, packed in bags, carriage paid U.K. stations.

**ACID CARBOLIC, ICE CRYSTALS.**—Practically no demand and quoted price reduced to 4d. per lb. delivered. This could probably be shaded for large quantities.

**ACID CITRIC, B.P. CRYSTALS.**—Offered for forward delivery at 1s. 4½d. per lb., less 5% c.i.f. U.K. ports. Spot material about 1s. 4½d. per lb., less 5% ex store.

**ACID FORMIC, 85%.**—Offered for prompt shipment from the Continent at about £47 per ton, c.i.f. U.K. ports. Spot material quoted £49 per ton, ex store.

**ACID HYDROCHLORIC.**—In little demand. Price 6s. 6d. per carboy, ex works.

**ACID NITRIC, 80°.**—Usual steady demand, quoted £23 15s. per ton, ex station, full truck loads.

**ACID OXALIC, 98-100%.**—Unchanged at about 3½d. per lb., ex wharf.

**ACID SULPHURIC, 144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads.** Dearsenicated quality, 20s. per ton more.

**ACID TARTARIC, B.P. CRYSTALS.**—Spot lots now quoted 1s. per lb., less 5%, ex store. Offered for prompt shipment at about 1½d. per lb., less 5%, ex wharf.

**ALUMINA SULPHATE, 17/18%, IRON FREE.**—Spot lots quoted £6 10s. per ton, ex store. Offered for prompt shipment from the Continent at about £6 5s. per ton, c.i.f. U.K. ports.

**ALUM, LUMP POTASH.**—Spot material unchanged at £9 7s. 6d. per ton, ex store. Offered for prompt shipment at about £8 per ton, c.i.f. U.K. ports.

**AMMONIA ANHYDROUS.**—Moderate demand and price unchanged at 1s. 4½d. per lb., less 5%, ex station. Containers extra and returnable.

**AMMONIA CARBONATE.**—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks, delivered U.K. ports.

**AMMONIA LIQUID, 88°.**—In steady demand. Unchanged at 2½d. to 3d. per lb., delivered according to quantity.

**AMMONIA MURIATE.**—Grey galvanisers' crystals quoted £28 per ton, ex station. Offered from the Continent at about £24 per ton, c.i.f. U.K. ports. Fine white crystals quoted £19 10s. per ton, c.i.f. U.K. ports.

**ARSENIC.**—Refined white Cornish arsenic at £24 10s. per ton, ex wharf, early delivery. Spot lots quoted £25 10s. per ton, ex store. Foreign arsenic on offer at £22 10s. per ton, c.i.f. U.K. ports.

**BARIUM CARBONATE, 98/100%.**—Offered from the Continent at £7 15s. per ton, c.i.f. U.K. ports, prompt shipment.

**BARIUM CHLORIDE.**—Spot material now offered at about £9 15s. per ton, ex store. Quoted £8 5s. per ton c.i.f. U.K. ports, prompt shipment from the Continent.

**BLEACHING POWDER.**—Spot lots English material, £10 10s. per ton, ex station. Contract, 20s. per ton less. Offer from the Continent at about £8 7s. 6d. per ton, c.i.f. U.K. ports.

**BARYTES.**—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

**BORAX.**—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

**CALCIUM CHLORIDE.**—English material unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, carriage paid U.K. stations. Continental dearer at about £3 17s. 6d. per ton, c.i.f. U.K. ports.

**COPPERS, GREEN.**—Now quoted £3 10s. per ton, ex wharf, packed in casks.

**COPPER SULPHATE.**—Offered from the Continent at about £21 15s. per ton, c.i.f. U.K. ports. English material for export unchanged at about £24 10s. per ton, f.o.b.

**FORMALDEHYDE, 40%.**—Offered for prompt shipment from the Continent at £38 10s. per ton, c.i.f. U.K. ports. Spot material available at about £39 10s. per ton, ex store.

**GLAUBER SALTS.**—English material unchanged at £4 per ton, ex store or station. Continental offered at about £3 per ton, c.i.f. U.K. ports.

**LEAD, RED.**—Inclined to be higher. Continental material now quoted £41 10s. per ton, c.i.f. U.K. ports. Spot material available at about £43 per ton, ex store.

**LEAD, WHITE.**—Quoted £43 per ton, ex store, spot delivery.

**LEAD ACETATE.**—White crystals quoted £44 10s. per ton, spot delivery; brown, £43 per ton, ex store. White crystals on offer from the Continent at £43 15s. per ton, c.i.f. U.K. ports; brown about £38 per ton, c.i.f. U.K. ports.

**LEAD NITRATE.**—In moderate demand. Quoted £42 per ton, ex station of f.o.b.

**MAGNESITE, GROUND CALCINED.**—Usual steady demand and price unchanged at about £8 per ton, ex station.

**MAGNESIUM CHLORIDE.**—Offered from the Continent at £5 per ton, c.i.f. U.K. ports. Spot material still available at about the same figure, ex store.

**POTASH CAUSTIC, 88/92%.**—Offered for prompt shipment at about £28 5s. per ton, ex wharf. Spot material quoted at about £30 per ton, ex store.

**POTASSIUM BICHROMATE.**—Price for home consumption, 5d. per lb. delivered.

**POTASSIUM CARBONATE, 96/98%.**—Quoted £25 5s. per ton, c.i.f. U.K. ports. Spot material available at about £26 5s. per ton, ex store.

**POTASSIUM CHLORATE.**—Still scarce for early delivery. Some available at about 3½d. per lb., c.i.f. U.K. ports. Spot material quoted 4d. per lb., ex store.

**POTASSIUM NITRATE, SALTPETRE, 99%.**—Refined granulated quoted at about £24 10s. per ton, c.i.f. U.K. ports. Spot material quoted £27 per ton, ex store.

**POTASSIUM PERMANGANATE, B.P. CRYSTALS.**—On offer at 7½d. per lb., ex store. Offered for prompt shipment from the continent at about 7½d. per lb., ex wharf.

**POTASSIUM PRUSSIATE, YELLOW.**—Nominally 7½d. per lb., ex store, but this price could be shaded for fairly large quantities.

**SODA CAUSTIC.**—76/77%, £18 per ton; 70/72%, £16 12s. 6d. per ton. Broken, 60%, £17 2s. 6d. per ton. Powdered, 98/99%, £21 7s. 6d. per ton. All carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

**SODIUM ACETATE.**—Quoted £19 10s. per ton, ex store, spot delivery. Offered from the continent at about £17 10s. per ton, c.i.f. U.K. ports.

**SODIUM BICARBONATE.**—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

**SODIUM CARBONATE.**—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Powdered or pea quality, £1 7s. 6d. per ton more. Alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

**SODIUM HYPOSULPHITE.**—English material quoted £9 10s. per ton, ex station. Pea crystals, £14 per ton, ex station. Continental on offer at about £9 5s. per ton, ex store.

**SODIUM NITRATE.**—Quoted £13 per ton, ex store. 96/98% refined quality, 7s. 6d. per ton extra.

**SODIUM NITRITE, 100%.**—Quoted £24 per ton, ex store. Offered from the continent at about £22 5s. per ton, c.i.f. U.K. ports.

**SODIUM PRUSSIATE, YELLOW.**—Rather better demand. Spot material now quoted 4d. per lb., ex store.

**SODIUM SULPHATE, SALTCAKE.**—Price for home consumption £3 10s. per ton, f.o.r. works. Good inquiry for export and higher prices obtainable.

**SODIUM SULPHIDE.**—English material: Solid, 60/62%, now £13 per ton; broken, £14 per ton; flake, £15 per ton; crystal, £8 10s. per ton; carriage paid U.K. stations, minimum four ton lots, with slight reductions for contracts to the end of the year; 60/62% solid offered from the continent at £10 15s. per ton, c.i.f. U.K. ports; broken, £1 per ton more; 30/32% crystals, £7 15s. per ton, c.i.f. U.K. ports.

**SULPHUR.**—Flowers, £10 10s.; roll, £9 10s.; rock, £9 7s. 6d.; ground, £9 10s.—per ton ex store. Spot delivery, nominal.

**ZINC CHLORIDE.**—100% quoted from the continent at £24 5s. per ton, c.i.f. U.K. ports. 97/98% of English manufacture on offer at £25 per ton, f.o.b. U.K. ports.

**ZINC SULPHATE.**—Commercial crystals on offer from the continent at about £12 per ton, c.i.f. U.K. ports.

**NOTE.**—The above prices are for bulk business and are not to be taken as applicable to small parcels.

### Coal Tar Intermediates and Wood Distillation Products

**DIMETHYLANILINE.**—Fair home inquiries, 2s. 1d. to 2s. 1½d. per lb.

**H. ACID.**—Fair home inquiries, 3s. 6d. per lb.

**ALPHA NAPHTHYLAMINE.**—Fair home inquiries, 1s. 3d. per lb.

## Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT]

Manchester, August 7, 1925.

THE tone of the Manchester chemical market keeps rather quiet, and the volume of business put through this week has been restricted, although just about the level of that of recent weeks. Only a moderate demand from the home consuming industries is being experienced, and inquiries for forward delivery are on a small scale. The demand on export account is also quiet. Quotations for most of the leading heavies are steady, but in some sections rather easy tendency is to be reported.

### Heavy Chemicals

Saltcake is not much changed from recent levels, though the inquiry for this material is not very pressing; current values range round £3 12s. 6d. per ton. Interest in glauber salts is also restricted, and prices are easy at £3 10s. to £3 12s. 6d. per ton. The demand for prussiate of soda is quietly steady at about 4d. per lb. Phosphate of soda is selling slowly at £12 10s. to £12 15s. per ton. Caustic soda continues to sell in fair quantities both for home consumption and for shipment; prices are firm at from £15 12s. 6d. per ton for 60 per cent. material to £18 for 76-77 per cent. Bleaching powder is still a comparatively dull section of the market, though at £9 10s. per ton quotations are unchanged from last report. Hyposulphite of soda meets with a quietly steady demand, and values are held at round £14 5s. per ton for photographic crystals and £9 5s. for commercial quality. Alkali is steady and fairly active at £6 15s. per ton. Acetate of soda is rather easy at round £18 per ton, and business is quiet. Soda crystals are in moderate request at £5 to £5 5s. per ton. Sodium sulphide is offering at about £12 15s. per ton for 60-65 per cent. concentrated solid and £9 5s. for commercial. Bicarbonate of soda is quiet but fairly steady at round £10 10s. per ton. Chlorate of soda is quoted at 2½d. to 3d. per lb., with business on the slow side.

Carbonate of potash is firm at £25 10s. per ton for 96-98 per cent. material, a moderate demand being met with. Caustic potash is quiet, but little changed in price at about £20 per ton. Permanganate of potash is selling rather slowly, but prices are about unchanged at 7½d. per lb. for pharmaceutical and 6d. to 6½d. for commercial quality. Prussiate of potash is firm and in fair request at round 7½d. per lb. Bichromate of potash is not too active, but values are held at 5d. per lb. Chlorate of potash is still on offer at 3½d. per lb.

There has been no development in the position of arsenic, demand still being very slow and values weak; white powdered, Cornish makes, is currently quoted at £21 per ton on rails in Cornwall and round £25 in Manchester. Sulphate of copper continues quiet at £24 10s. per ton. Commercial Epsom salts are easier at £4 to £4 5s. per ton; magnesium sulphate, B.P. quality, is offering at about £5 15s. per ton. Acetate of lime is quiet and easy at £14 per ton for grey material and £7 15s. to £8 for brown. Acetate of lead is steady and in moderate request at £44 per ton for white and about £40 for brown. Nitrate of lead is slow, but unchanged in price at £40 to £41 per ton.

### Acids and Tar Products

Among the acids acetic is in limited request and values are slightly less steady; 80 per cent. commercial is quoted at £37 to £37 10s. per ton and glacial at about £67. Oxalic acid is still inactive, though quatably unchanged at 3½d. per lb. Tartaric acid is steady and in moderate request at about 1s. per lb. Citric acid is on offer at 1s. 4½d. per lb.

Comparatively little movement has occurred in coal-tar products. Carbolic acid is exceedingly dull at 4d. to 4½d. per lb. for crystals and 1s. 4½d. per gallon for crude. Pitch is an uncertain section and actual business is quiet, values being nominally about 40s. per ton. Solvent naphtha is in limited supply and values are steady at round 1s. 6d. per gallon. Creosote oil is still quoted at about 6d. per gallon. Naphthalene is in small demand at about £13 10s. per ton for refined and from £4 10s. for crude qualities.

## London Chemical Market

London, August 6, 1925.

BUSINESS at the time of writing has hardly reopened, and it is therefore unnecessary to give our usual review of the market, as there is no change whatever in price or conditions since the date of our last report.

The only point that might be emphasised is that, if anything, the export demand seems to be a little better, which would indicate that stocks in a number of markets are somewhat short.

### Latest Oil Prices

LONDON.—LINSEED OIL firm and 5s. to 7s. 6d. higher. Spot, £42 5s.; August, £41 7s. 6d.; September to December, £41 10s.; January-April, £40 17s. 6d. RAPE OIL quiet. Crude, crushed, £48 10s.; technical, refined, £51 10s. COTTON OIL firm. Refined common edible, £49; Egyptian crude, £44; deodorised, £51. TURPENTINE quiet and 3d. to 6d. per cwt. down. American, spot, 67s. 3d.; September-December, 68s. 3d.; and January-April, 70s. 3d.

HULL.—LINSEED OIL.—Spot and August, £41 5s.; September-December, £41 2s. 6d.; January-April, £40 15s. COTTON OIL.—Bombay, crude, £40; Egyptian, crude, £43 15s.; edible, refined, £47 10s.; deodorised, £49 10s.; technical, £43; PALM KERNEL, crushed, naked, 5½ per cent., spot, £44. GROUNDNUT OIL, crushed/extracted, £48; deodorised, £52. SOYA OIL, extracted and crushed, £42 10s.; deodorised, £46. RAPE OIL, extracted, £47 10s. per ton, net, cash terms, ex mill.

## Nitrogen Products Market

*Export.*—During the last week the demand for sulphate of ammonia for prompt shipment has continued steadily, and prices have remained unchanged, sales being made on the basis of £11 10s. per ton, f.o.b. in single bags. Now that the threat of a coal stoppage is no longer exercising its restraining influence there has been more interest in forward positions, and sales have been made at slightly above the prices for prompt shipment. Most of the demand is from the Continent and the Far East.

*Home.*—The prices have now been announced for delivery up to the end of November as follows:—August, £12 5s.; September, £12 7s.; October, £12 9s.; November, £12 11s.; for neutral quality, basis 21·1 per cent. nitrogen, delivered in 4-ton lots to consumer's nearest station. At the moment there is little interest in the prompt market, but some bookings have been made for forward positions.

*Nitrate of Soda.*—The nitrate of soda market remains steady, and cargoes c.i.f. European ports are changing hands at about £11 6s. per ton. At present, buyers appear to be holding off, but it is doubtful if a further drop will take place.

## American Market Movements

(From *Drug and Chemical Markets*.)

Demand for industrial chemicals proceeds in a satisfactory way. Prices are being maintained on practically the entire list. Formic remains weak.

Intermediates cut rather sharply by makers owing to large stocks and price-cutting. Gamma and N and W acids cut. Meta-toluyenediamine lower. Para-nitrotoluene and para-toluidine down. Benzene is in strong position. Other light oils firm. Pyridine strong.

The tone of the fine chemical market is more wholesome, with trading along routine lines. Prices are steady almost throughout the list, indicating firm positions.

Linseed oil down slightly. Chinawood oil steady. Other vegetable oils holding well. Cottonseed oil up. Animal oils remain in strong positions. Greases move at high prices.

## German Rayon Plant in U.S.A.

A RAYON plant is to be erected in the United States by J. P. Bemberg, Ltd., German rayon manufacturers, who are represented there by Wolf, Strauss and Co., New York. A company with a capital of \$17,500,000 has been incorporated.

## Company News

J. AND J. CUNNINGHAM, LTD.—Dividend of 10 per cent., less tax, on ordinary shares, and £24,485 carried forward.

SENTINEL WAGGON WORKS.—Usual interim dividend on the 7½ per cent. preference shares for six months ended June 30. WILLIAM FULTON AND SONS.—Final dividend and bonus of 12½ per cent. on ordinary shares, making 15 per cent. for past year, writing off £6,000 for depreciation, and carrying forward £7,768.

W. AND H. M. GOULDING.—Profits for the year ended June 30 were £37,946, and £3,476 was brought forward. A dividend of 5 per cent. is proposed on ordinary stock, adding £5,000 to the depreciation account, and carrying forward £2,297.

NATIONAL SOCIETY FOR THE PRESERVATION OF PROPERTY (BY PAINT AND VARNISH), 25, Victoria Street, S.W.—A company limited by guarantee and not having a share capital, with 5,000 members, each liable for a certain sum in the event of winding up. The objects are:—To promote any scheme having for its object an increase in the public use of paints, varnishes, and other products of a similar or allied nature, applied to any structure, material or thing, for the preservation or protection thereof, etc. The management is vested in a Council of leading members of the trades.

CELLOLOSE HOLDINGS.—Net profit for the year ended June 30, after meeting expenses, debenture interest, making provision for taxation, and debenture stockholders' participation in profits, was £35,134, which compares with £14,830 for the preceding year. A balance of £1,257 was brought forward. Directors propose a dividend of 6d. per share, or 50 per cent., free of tax (against 25 per cent.), leaving £9,879 to be carried forward, subject to directors' additional fees. The holding of ordinary shares in the Midland Counties Electric Supply Co. has been sold, and the proceeds applied in purchasing debenture stock of the Cellulose Holding Co., which has been cancelled.

BENN BROTHERS, LTD.—Report for year to June 30 last states that requirements of the company were not such as to justify further issue of capital during year, but in order to continue policy of giving members of the staff facilities for acquiring an interest in the business, directors have inaugurated savings scheme whereby employees have opportunity of putting aside regularly portion of their earnings, which will be ready for investment in company's shares as and when any become available. Position of the company's journals and other publications well maintained. During year opportunity arose and was taken to purchase shares in William Rider and Son, Ltd., publishers of the *Timber Trades Journal* and other kindred publications. Net profit amounts to £31,426, and balance brought forward was £11,165, making £42,591. Reserve fund gets £10,000 and for appropriation £32,591. Directors recommend dividend of 17½ per cent. per annum, less tax at 4s. 4½d., leaving to be carried forward £15,321.

## Chemical Trade Inquiries

*The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.*

CEMENT, OIL, ETC.—Tenders invited by Bishop Auckland Council for supply of paint oil, cement, sulphate and alumina. Particulars from Surveyor, Town Hall Buildings, before August 17.

LIME, CEMENT, ETC.—Tenders invited by Brentford Council for the supply of lime, cement, oils. Forms from Surveyor, Clifden House, Brentford, before August 29.

SPENT OXIDE ACID.—Tenders invited by Wallasey Corporation for supply of about 700 tons of spent oxide acid for the manufacture of sulphate of ammonia, over a period of twelve months from August, 1925, for the Corporation, to be delivered in accordance with specification, to be obtained from the Engineer, Limekiln Lane, Wallasey. Sealed tenders, addressed to Mr. G. Livsey, town clerk, Town Hall, Wallasey, endorsed "Tender for Spent Oxide Acid," to be delivered per post at the Clerk's Office by the morning of August 19. The contractor or contractors will be required to enter into a contract, with approved sureties, for the performance of contract.

BITUMINOUS TAPE.—The Post and Telegraph Department, Wellington, are calling for tenders, by September 22, for the supply of bituminous tape. A copy of the general conditions is available for inspection at the D.O.T. (Room 52). (Reference No. B.X. 1943.)

OILS, CHEMICALS.—A firm in Valparaiso wishes to represent British firms manufacturing or exporting soya oil, linseed oil, caustic soda, siccative of soda, sodium sulphide, sodium hyposulphite, sodium bicromate, potassium chlorate, aluminium sulphate, amorphous phosphorus, etc.

TAR SPRAYING MACHINES.—A firm in Copenhagen is desirous of getting into touch with manufacturers of automatic tar-spreading machines.

## Commercial Intelligence

*The following are taken from printed reports, but we cannot be responsible for any errors that may occur.*

### London Gazette, &c.

#### Winding-Up Petition

HADFIELD'S CHEMICAL WORKS, LTD. (W.U.P., 8/8/25.) Creditor's petition for winding-up has been presented and is to be heard at the Royal Courts of Justice, Strand, London, on October 13.

#### Bankruptcy Information

SAPHIER, L., AND SONS, other than Albert Saphier, 58, St. Stephen's Road, Bow, London, perfumers. (R.O., 8/8/25.) Receiving Order, July 23, creditor's petition. First meeting, August 17, 11 a.m., and public examination, September 22, 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

#### Partnership Dissolved

LONDON COLLEGE OF CHEMISTRY, PHARMACY AND BOTANY (Henry WOOTTON and Charles William GOSLING), 361, Clapham Road, S.W.9, by mutual consent as from March 31, 1925.

#### Mortgages and Charges

[NOTE.—*The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.]*

MORDLE (F. DARE) AND CO., LTD., Nottingham, starch manufacturers. (M., 8/8/25.) Reg. July 24, £600 debentures balance of £5,800; general charge, \*£9,000. April 30, 1924.

NEW PACCHA AND JAZPAMPA NITRATE CO., LTD., London, E.C. (M., 8/8/25.) Reg. July 24, £20,000 (not exceeding) charge (executed out of the U.K.), to Anglo South American Bank, Ltd., Iquique, Chile; charged on personal property, chattels and effects at Oficinas Paccha and Jazpan pa and at store rooms at Pisagua, also nitrate stock at dumps at said Oficinas, and nitrate deposited and which may be deposited at store rooms at Port of Pisagua. \*Nil. May 28, 1924.

#### Satisfaction

DEARBORN (1923), LTD., London, W.C., chemists. (M.S., 8/8/25.) Satisfaction reg. July 28, £19,297 5s. 8d., part of amount reg. January 10, 1923.

## New Companies Registered

HYAMS AND DAW, LTD.—To carry on business of metallurgists, metal refiners, manufacturers of, and dealers in, chemicals and chemical substances, etc. Nominal capital, £1,000 in £1 shares. B. H. Hyams, 25, Redcliffe Street, Redcliffe Gardens, London, S.W.10.

J. W. BRACEWELL AND CO., LTD.—To acquire the business of chemical manufacturer and manufacturing chemist carried on by J. W. Bracewell, at Orchard Hill, Railway Station, Ramsbottom. Nominal capital, £5,000 in £1 shares. Solicitors: Addleshaw, Sons and Latham, 15, Norfolk Street, Manchester.

